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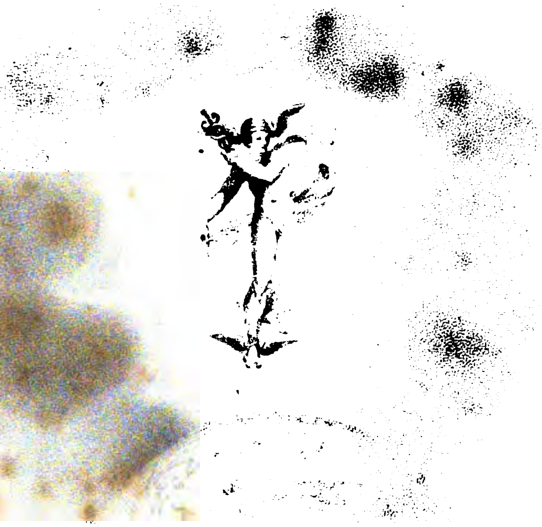

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PREFACE.

In completing the First Volume of our Journal we trust that its execution will be found to have equalled, if not exceeded, the design with which we announced it to the Public.

We have steadily kept in view an early report of all New Patents, and a detail of their respective principles and properties, divested as much as possible of that technical language which too often precludes both perspicuity and common sense.

We have also been careful to supply the earliest information relative to every useful Discovery and Invention in Practical Mechanics; as well as such other novel inventions as are applicable to the arts, manufactures and agriculture; and also to the sciences generally, which are interesting.

To our various Correspondents we beg to return our

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X.

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No. I.

◆

Recent Patents.

To JOHN BOGAERTS, *for an Invention of a Method of raising and lowering the Water of Canal Locks.*

THE great advantage accruing to the public from a ready communication with every part of the kingdom, is so obvious in a mercantile point of view, that any comment upon its utility is altogether unnecessary; and as the facility as well as economy, of conveying cumbersome and weighty goods by means of inland navigation are fully appreciated, it follows that every invention calculated to aid this object, must be of advantage to the community.

Among the various projects for preventing the loss of water in passing boats, from one level to another, through Canal Locks, that described in the specification of Mr. Bogaerts' patent, now before us, appears to be decidedly preferable.

The great and desirable object of preventing the escape and loss of water, in passing boats from an upper to a lower level, and *vice versâ*, has been attempted by many persons: to effect which purpose wells or cisterns of water have been proposed, communicating with the lock. These wells or cisterns are always calculated to contain a quantity of water sufficient, if transferred, to fill the lock up to the height of the upper level of the canal; which water is to be forced out of the wells or cisterns into the lock of the canal, by introducing plungers of sufficient bulk to displace it from the cisterns.

The design of the present patent, is to do this by means of an apparatus extremely simple in its nature, and more easily worked than any before known.

Plate I.—Fig. 1, is a section of a pair of canal-locks, shewing the upper and lower level of water. If a vessel were passing from A, the upper level, towards B, the lower level, the lock C, must be filled with water up to the dotted line, even with the water of the upper level. The gates *b* being shut, and the gates *a* open, the vessel is then brought into the lock C, and after closing the gates, *a*, the water in the lock is allowed to subside, down to the level of the lower part of the canal; when the water will stand in the lock at the lower line, by which the vessel is enabled to proceed upon the lower level onward. This is the ordinary operation in passing boats from one level to another, through canal locks; but at the expense of so much water as filled the lock up to the dotted line, which must flow away and escape.

Fig. 2, represents a section of the apparatus, as proposed by the patentee, in which are seen the cisterns. A A, with curved sides, holding water; and the double plunger B B, with corresponding curved sides, mounted upon a knife-edged fulcrum C, and balanced so as to oscillate with little or no friction; here it will be evident, that, when one end of the plunger B, is depressed, the water in that cistern, into which it descends, will be displaced, there being an opening, *a*, at the bottom of the cistern, sufficiently large to enable the water to pass from thence into the lock with which it communicates.

The peculiar advantage of this apparatus is, that the plunger, in whatever position, is balanced in equilibrium, as will be seen hereafter.

In the lower parts of the double plunger are hollow air-vessels, *b b*, for the purpose of rendering the apparatus lighter; but these air-vessels are not absolutely essential to its operation, as the plunger may, in this part, be made solid; the simple object being to provide a space equal to that of the water to be displaced.

The upper part of the plunger forms a vessel, containing water, and when it is suspended upon the fulcrum C, and properly balanced, the water in this vessel will be equally divided between the two sides of the plunger, the whole apparatus being equipoised.

Now, to make either of the ends of the plunger preponderate, as shewn at Fig. 5 and 6, will require but the application of a small power or weight, there being little more to overcome than the friction and *inertia* of the water. When this power or weight is applied to either end of the plungers, so as to make it sink, the water in the vessel B B, will flow towards the descending end, and the accumulated weight of water, aided by the small weight or power applied to put it in action, will cause the plunger to descend and displace the water from one of the cisterns, forcing it into the lock, to which that cistern is connected, through a channel *a*, (see Fig. 3); and thus the water in the lock will be raised. But as the buoyancy of the air-vessel at the one end, and part of the weight of the apparatus at the other, are to be taken into the account, the plunger will not descend to the bottom of the cistern without some additional weight or power beyond that above described. The patentee has therefore placed a small vessel of water along the top, over the plunger, lengthways, which he calls a compensator, D, to act as a lever, in which the water naturally flows to the descending end, and gives the required additional weight to overcome the buoyancy of the air-vessel, causing the plunger to descend to the bottom of the cistern, and thus to displace the water it contained, and force it into the lock.

The water in the lock Z, Fig. 3, now standing at its greatest height, or up to the higher level of the canal, by the descent of the plunger above described, in order that a vessel from the upper level may proceed to the lower level, the gates X, are opened, and the vessel passed into the lock Z ; the gates X, are then closed, and the weight or power which had been put upon the end of the plunger, is transferred to the reverse end, when the depressed end of the plunger will rise, and the water again empty itself from the lock Z, into the cistern, causing the water and the vessel in the lock to descend.

It will be here seen, as the two cisterns do not communicate with each other, that, when one end of the plunger descends and forces the water out of one cistern into the lock connected to it, the other end of the plunger being elevated, will enable the water in the other cistern to rise, and consequently draw off the water from the other lock, Y, down to the lower level; a vessel may be then introduced from the lower level, and raised in the lock to the upper level by the same process as described above.

If this apparatus be placed between two locks, one communicating to one cistern, and the other lock to the other, as seen in Plan, Fig. 3, the passage of vessels may be somewhat facilitated; but it is proposed by the patentee, in some cases, to erect the apparatus on the side of a canal lock, which will considerably diminish its expence, occupy less room, and be found upon canals where the traffic is not very great as the most convenient adaptation of this invention.

In this situation a tank, in place of the canal lock, must be provided, of equal capacity to the cisterns, with which it is to communicate, in order to receive the water displaced by the descent of the plunger, and the operation will be the same as before described, but which will occupy rather more time than by passing the vessel through the double lock.

We are favoured with another modification of this invention, by Mr. Brian Donkin, under the authority of the patentee; which, instead of placing the plunger between the two canal locks, in the manner before described, and instead of passing the vessel from one level to the other by one operation of the plunger, it is proposed to construct two locks in a line with each other, as A and B, Figs. 4. Plan and Sections. Here will be seen three pairs of gates, x, y, z. When a vessel is intended to be passed through the locks, the plunger must be made to descend at the end C, consequently the water will be forced from the cistern under C, and driven into the lock A, raising it to the upper level of the canal, as shewn by a dotted line in the section; the gates x, are then to be opened, and the vessel passed into the lock A. The gates x being again closed, the weight or power upon the end of the plunger at C, is to be removed to D, which will cause the end D, of the plunger, to descend, and the end C to ascend, by which means the water in the cistern under D, will be forced into the lock B, up to the dotted line, and at the same time the water of the lock A will subside into the cistern under C, and thus the water of both locks, A and B, will be brought to a level; the gates *y* are then to be opened, and the vessel brought into the lock B. The gates *y* are to be again closed, and the plunger caused to descend at C, by which means the water will recede from the lock B, down to the lower level of the canal, when the gates, *z*, are to be opened, and the vessel passed forward, having been lowered by two operations of the plunger, from the upper to the lower level of the canal.

Precisely the same process is used in bringing a vessel from the lower to the higher level; and the whole operation is performed in much less time than the ordinary passage of boats through the common lock. The very great desideratum, that of retaining the water, (which by the common process would be wasted) is, by the apparatus of the patentee, fully accomplished, with the exception of the common leakage at the gates, to which lock-gates at times are, and must be subject.

Inrolled, May, 1819.

To AUGUSTUS SIEBE, *and* HENRY MARRIOT, *of Fleet-street, London, for an improved Weighing Machine.*

THIS patent consists of a box or frame containing a flexible ring, or a spring of a round or oval form, or two springs conjoined together, so as to produce the effect of a circular or elliptical endless spring. The suspending part or handle is attached to the box and upper side of the flexible ring, and the pendant rod, with a hook for the purpose of receiving a scale, is attached to the lower side of the ring, consequently the ring becomes elongated by the weight applied in the scale to the pendant rod; and, in order to measure the weight or power exerted upon the spring, a small compound lever attached to the top of the pendant rod, is connected with an index moving upon a centre arbour, which index, by that means, is carried round a dial-plate, indicating the weight in the scale below.

Several modifications of this principle are proposed by the patentees: as in the form of the spring, which may be of two or more pieces, bent in various forms, but so conjoined together as to produce the effect of an elastic ring; they likewise avail themselves of the use of a compensating spring, in order to regulate the power of the principal spring in the event of its being affected by different degrees of temperature; they propose also, instead of the compound lever moving the hand or index as above, to apply a rack to the top of the pendant rod, which shall work into a pinion upon the axis of the index, and by the lowering of the pendant rod, turn the pinion carrying the index, which upon the face of the dial indicates the power excited upon the spring, or, what is tantamount, the weight of the articles in the scale.

Upon the whole, the patentees confine their exclusive claim to the adaptation of a circular or elliptical spring as above described, for the purpose of a weighing machine; not claiming any of the other parts, as the levers, or rack and pinion, they having been long known to be in use, combined with other contrivances for the same purposes.

Inrolled, June, 1819.

This invention has been opposed as an infringement and trespass upon the patent of J. S. Pauly, for a Weighing Machine obtained in 1818, the principles of which patent are the adaptation of two upright steel levers, springs attached to the sides of a box, and one horizontal elastic steel piece, as a strap, laying across the top, and connecting the flexible ends of the upright lever springs together.

The box being fixed or hung up by means of a handle, or otherwise, the scale is to be attached to a pendant rod, the upper end of which hangs upon the horizontal elastic piece or strap above described, and in proportion to the weight or power placed in the scale, so will this elastic horizontal piece be bent downwards, and the ends of the side springs connected thereto, be drawn inward. The effect of which weight or power, operating upon the springs, is to be measured by an index turning upon a dial plate, carried round by means of a pinion, working into a rack upon the pendant rod, nearly as described in Siebe and Marriot's patent above.

But as this contrivance of the rack and pinion was long before applied to a Weighing Machine, having a helical spring,(see Transactions of the Society of Arts, vol. xxxii); and as Weighing Machines, with differently constructed springs, were previously before the public, it follows that the invention of Mr. Pauly must be confined strictly to the peculiar sort of spring set forth in his specification; and as no other kind of spring or modification of parts is there suggested, it is conclusive that each patentee must confine himself to the peculiar kind of spring, and that only, which he has described in his specification, for by taking a greater latitude, he would include other Weighing Machines, with differently constructed springs, which were before the public prior to the date of both patents.

The plea of trespass, Pauly v. Siebe, was heard before Sir Charles Abbott, in the Court of King's Bench, Guildhall, London, on the 7th of January last; when it was argued, that as the principle of a weighing machine with springs, was not new, it could not be exclusively maintained by the plaintiff; and that, as Siebe, the defendant, had not constructed his Weighing Machine with a spring or springs similar to that described in the plaintiff, Pauly's, specification, the defendant, Siebe, was entitled to a verdict. The Court being of this opinion, a verdict was given to the defendant, he not having committed a trespass upon the patent right of Pauly.

This verdict, however, does not disturb the validity of either of the patents, nor question their originality; but leaves the respective patentees in the full possession of their exclusive monopoly and patent right.

To WILLIAM BAILEY, *of High Holborn, London, for an Invention of certain Improvements in the Construction of Sashes, Sky-Lights, and Frames, generally used for the Admission of Light and the Exclusion of Rain and Snow; also for making Roofs or Coverings for Houses and various other Buildings.*

THIS inventor proposes the use of iron bars which after rendering them red hot, he passes through grooved rollers, so as to produce rebates on the side intended to receive the glass, and any other form of moulding upon the reverse of the sash frame; the bars are then cut into convenient lengths, and fitted together, so as to form the frame of any desired dimensions. After this the glass is to be attached by putty, paint, or the common modes of cement to the sash frame. For such windows as are of a curved form, particularly those in the Gothic style, this invention may be made peculiarly applicable by bending the bars (after they are rolled into the mouldings as above) to any desired or fanciful form, and so producing, at a comparatively small expense, substantial sash frames of (by any other means) the most difficult construction.

In the erection of hot-houses, green-houses, and all kind of conservatories, the patentee considers this invention particularly desirable, as it combines strength, lightness, economy and durability. For the purpose of roofs it is recommended, after fixing the frame of moulded bars as above manufactured, to take sheets of iron, tin, copper, or other suitable metal larger than the spaces between the bars, and, after turning up the edges square on each side, to cover and enclose them in a grooved slip: the whole to be firmly attached together by means of rivets, screws, pins, or the like. It is obvious also that any other metal may be wrought as above; but the patentee most particularly recommends iron from its cheapness: he, however, embraces every other material capable of being moulded and bent by his proposed process.

Inrolled, Jan. 1819.

To William Bundy, *of Camden Town, Middlesex, for an Invention of certain Machinery for breaking and preparing Flax and Hemp.*

The Breaking Machine, set forth in the present patent, is more simple in its construction than any of the former machines which Mr. Bundy, possessing very considerable ingenuity, has invented for the purpose of breaking and dressing flax and hemp. He now proposes to construct a frame, carrying three fluted or indented rollers, formed as the frustrums of cones, about seven inches long, in the working part, three inches and a half in diameter at the largest end, and two inches at the smaller end; of course not confining himself strictly to these precise dimensions.

Two of the rollers are placed in proper carriages at the bottom, and the third above, lying upon, but not in immediate contact with the two lower ones: they all revolve upon axles; the lower two supported by the frame, and the upper one by a carriage connected to a lever, by which this roller is to be raised or lowered at pleasure.

There are, however, springs applied to keep the upper roller raised about two inches above the lower ones, in order that there may be an opening for the purpose of introducing the raw flax between them, which is to be taken in the hand, and when placed upon the lower rollers, and distributed equally, the foot of the operator presses upon a treaddle connected to the lever and carriage of the upper roller, by which means the upper roller is pressed down upon the flax. The hand of the operator then draws the flax out from between the rollers, by the indentations and pressure of which the woody parts of the flax are broken.

Upon removing the foot from the treaddle, the lever rises, and the spring mentioned above, forces up the upper roller, for the purpose of again introducing the flax between the rollers, which, when distributed, is again pressed upon by the upper roller, forced down by means of the lever and treaddle, and the flax drawn out as before.

This operation is continued until all the boon or woody parts of the flax become entirely broken, and separated from the fibre, observing that the first breaking of the flax should be performed at the larger end of the rollers, and the finishing at the smaller end; the flutes or grooves becoming finer, as they approach toward the smaller end of the frustrum.

When it is intended that the flax should be bleached before it is spun, the patentee adopts the following process; he constructs trays or cradles with open lath or wicker bottoms, into each of which he lays small parcels of the flax (prepared as above) of about one ounce, each parcel tied loosely together in the middle; the trays, piled upon each other with the flax in them, are immersed in cold soft water for a day or two, after which each parcel is to be worked in a machine while wet, precisely as above described; but the latter machine should have cylindrical fluted rollers, which are not to be of metal.

This last operation is designed to loosen the gluten and colouring matter, previous to the rincing and wringing, which is to follow.

The flax is then to be deposited again in trays and soaked in soft water, in which a small quantity of soap is to be previously dissolved, in the proportion of about seven pounds of soap to one hundred weight of flax, and in this state it is to remain for two or three days longer, and then again be worked through the machine, and rinced and wrung, which will render it sufficiently white for most purposes.

But if it is required to be still softer for spinning into yarn of the finest quality, it must be boiled in a considerable quantity of water and soap for about half an hour, placed in the trays as before, and agitated during the whole time of its immersion, then carefully removed and dried.

After this it will be advantageous to work it through the first described machine, with conical rollers, in order to open it sufficiently for hackling or dressing.

By these means the Patentee considers, that the boon or woody particles will be easily and perfectly removed, and the bleaching and cleansing more effectually accomplished, than by any simple hackling, soaking or boiling, hitherto adopted without the aid of machinery.

Inrolled, Oct. 1819.

To THOMAS BROCKSOPP, *of Fore-Street, Cripplegate, for the Application of certain Machinery to the Purpose of breaking or crushing of Sugar.*

THIS invention consists in applying a small mill, to break the lumps of raw sugar, upon taking it out of the hogshead, and is intended to supersede the necessity of pounding them with a mallet or hammer as commonly practised by the retail grocer. The apparatus is simply a pair of rollers, between which the sugar passes from a hopper above, and falls into a box below: the rollers are made to revolve against each other by means of a cog-wheel and pinion upon their respective axes worked by a handle; and as the cog-wheel and pinion cause the rollers to turn with different degrees of velocity, they will necessarily rub against each other, which will more effectually reduce the sugar to powder. There is a scraper placed under the rollers to prevent the sugar from adhering, and the motion is regulated by the application of a fly-wheel.

Inrolled, Aug. 1819.

To TEW COWPER, *of Biston by Weedon, Northamptonshire, for an Invention of certain Improvements on, and in addition to, Machinery or Ploughs for the Purpose of Under-draining Land.*

THE first part of this invention consists of a coulter, with a mole-iron or borer at its bottom, to be lowered into the ground and drawn along, preceded by a circular cutter to relieve its way, and followed by a roller to close the channel made by the cutter and coulter, leaving the channel thus formed by the mole-iron entire at any desired depth below the surface of the ground; which depth is regulated by vertical screws raising or lowering the said cutter and mole-iron in its carriage, assisted, of course, by small wheels or rollers as commonly applied to plough-carriages. The second part of the invention consists of a standard with a capstan turning horizontally, upon which a chain coils that is to be attached to the plough. This standard is secured by means of an anchor, from shifting its ground, while the capstan bar is carried round by one or more horses as in a mill, or by manual labour; and the draft-chain, as expressed above, winding round the capstan, draws the plough-carriage to which it is attached, with cutter and mole-iron forward. When this last contrivance is not used, the plough is to be drawn forward by horses as in the common process of ploughing. This invention as applied to hollow or under-draining; viz. the mole-iron with its carriage, and the capstan with its carriage and anchor as a fulcrum, is considered by the patentee to be entirely new, and of which he claims the original invention.

Inrolled, May, 1818.

To EDWARD WALL, *of Minchinhampton, Gloucestershire, Gent. for the Invention of certain Improvements in Stage Coaches, and other Descriptions of Carriages.*

THIS invention consists of a carriage body, the parts of which are so arranged that there are two compartments for inside-passengers at a distance from each other, between which is a space uncovered with seats for outside-passengers, and beneath a box for luggage; by which contrivance the patentee conceives that the weight will be more equally and advantageously distributed over the springs and axle, and the carriage rendered more safe and eligible for the conveyance of passengers, than any other sort of carriage previously constructed for that purpose.

Inrolled, July, 1819.

To H. P. FULLER, *of Piccadilly, London, for an improved Method of producing or procuring Sulphate of Soda, (Glauber's Salts,) Soda, Subcarbonate of Soda, and Muriatic Acid.*

THE patentee proposes a solution of muriate of soda, (prepared either by dissolving in hot or cold water; or by evaporating sea water; and which solution may contain any quantity of muriate of soda, that is or may be soluble in water:) to be mixed with a solution of sulphate of iron, in such quantity that there shall be forty-seven parts and a quarter, or thereabouts, of the sulphate of iron, to twenty parts, or thereabouts, of the muriate of soda. These materials so combined, are to be submitted to heat, so as to evaporate nearly the whole of the water; the remaining mass or quantity is then to be exposed to a full red heat in a retort of cast iron, or of any other material which is capable of bearing the fire, (the particular form or size of the retorts, it is not necessary to describe, as that is not of importance for the performance of the process,) for the purpose of distilling over the muriatic acid, which will be separated by the heat from the aforesaid mass or residue left from the above mentioned solutions of muriate of soda and sulphate of iron; but which solutions, after they have been mixed as above directed, will be found to be changed into solutions of muriate of iron, and sulphate of soda. The muriatic acid is to be received into a condensing receiver, containing any quantity of water: and when the whole of the acid, or nearly so, has been drawn over, the residue, which will be found to contain sulphate of soda, and oxyd of iron, partly or almost entirely, in a micaceous form, or *with some trifling quantity of muriate of soda, muriate of iron, and sulphate of iron,* must be dissolved either in hot or cold water, and filtered to separate the oxyd of iron. The mode or modes of dissolving the mass, and filtering the solution, it is not necessary to explain, as any particular mode is unimportant, and the manner of doing it will occur to every one acquainted with such operations. The solution of sulphate of soda is now to be mixed with a solution of caustic, or pure barytes, prepared by burning or calcining carbonate of barytes, and then dissolving it in water, in such quantities, that there shall be to every twenty parts of muriate of soda, or thereabouts, used in the first part of the process, twenty-seven parts or thereabouts, of pure or caustic barytes: the produce of this will be pure or nearly pure soda and sulphate of barytes. The soda is then to be separated from the sulphate of barytes by filtration or any other method which may be deemed eligible. If the sub-carbonate of soda is to be prepared, the solution of pure soda must be combined with the carbonic acid, expelled from carbonate of barytes, or carbonate of lime, by burning or calcining them, or by any other method; but the manner of adding the carbonic acid is not claimed by the patentee, except as is above specified.

Inrolled, September 6th, 1819.

To THOMAS MORTON, *of Leith, for a Method of dragging Ships out of Water on dry Land, for the Purpose of Repairs.*

THIS apparatus consists of three railways constituting a plane inclined at nearly the same angle as the slips generally used for building ships. This railway is placed on a sloping beach, and extends from above the reach of the tide, to low-water mark. A carriage or frame of wood, runs along the iron railway, upon rollers or truck wheels, having flanges to guide them. Blocks are laid upon the middle or keel-beam of the carriage, to such a height, that the keel of the vessel may clear the ends of the cross pieces; each block embraces four trucks, two on each side of the beam. There are also blocks, which slide upon the cross pieces, made up to correspond to the rising of the vessel's bottom. They run out to the extremity of the cross pieces, and their ropes, crossing the carriage, are reeved through a sheave attached to the opposite cross piece, up to the top of the rope. The shores, when any are necessary, are put into their places, turn upon a joint and are secured, when the vessel is floating on, from falling outward by a small chain.

When a ship is to be hauled ashore, the carriage thus prepared is let down the inclined plane, generally at low water. The chain of a powerful capstan is then attached to the carriage, and a water staff is placed at the fore end of the keel-beam, to mark the depth of the water, and be a guide in floating on the vessel. The vessel is then brought to the lower end of the carriage and hauled over it, having bow and quarter lines to steady her till the advanced part of the keel takes the blocks at the contracted part of the guides, which are just wide enough to receive it. Being still afloat abaft, having been previously so trimmed, the vessel is then adjusted over the block abaft by a water-line. Iron guiders are then hauled up by ropes, by which she is confined to settle down truly. By heaving the capstan, she will soon take the blocks abaft, which is observed by the water mark left on her bottom; she is trimmed upright, and the foremost bilge or sliding blocks hauled tight. As she rises out of the water, each succeeding block is hauled in, but not till the weight of the vessel has settled well on her keel. The sliding blocks are prevented from springing back by their palls or catches falling into their racks; the shores are brought to her sides, and there secured. When thus secured she is hauled up the inclined plane at the rate of two and a half to three feet per minute, by six men to every hundred tons. Being hauled up she is shored from the ground; the keel-beam is secured from moving, and the sliding blocks with their cross pieces are, in a few minutes, removed, when the vessel is ready to be repaired.

The blocks being relieved from the vessel in the usual manner, the keel-beam, with the after cross-beam, will run from under her. The carriage is again put together, and another vessel can be hauled up astern of the former.

When a vessel is to be launched the cross pieces with their blocks, are put under her, and she is instantly let into the water. Or, to launch and haul vessels up the same tide, temporary blocks are put under the bottom of the vessel to be launched, upon the cross pieces, instead of the sliding blocks, which are prepared as before, to suit the vessel's bottom to be taken up: the vessel is launched; when she, and the temporary blocks which steadied her, float from the carriage, and the other vessel is taken on, and hauled up as described above.

One of the great advantages of this apparatus, is, that it can be constructed in situations where it is impossible to have a dry dock; and that it can be removed from one place to another, and may even be carried on board a ship. Being above ground, the air has a free circulation; the men work with more comfort; and in winter they have the light much longer than in a dry dock. Time is also saved in carrying the materials for repairing the ship; and such is the facility of the operation, that ships can be hauled up, inspected, and even get a trifling repair, and be launched again the same tide. The mechanical power being attached solely to the carriage, the vessel is exposed to no strain.

A slip for a vessel of three hundred tons can be constructed for about five or six hundred pounds. The expense of taking up a vessel will not exceed from twenty-four to thirty shillings.

Inrolled, May, 1819.

The following statements of expense have been published under the sanction of Mr. Morton.

	£	*s.*	*d.*
First. Middle and side ways of the inclined plane of American red pine, with cast-iron railways, complete, three hundred feet long, at twenty shillings - - -	300	0	0
Second. Carriage or moveable frame, the			

	£	*s.*	*d.*
keel and side-beam, of which are American white oak, all the cross-beams English oak, free of sap, with sliding and keel blocks, with its trucks and axles turned, and all other iron work complete - - - -	240	0	0
Third. Chain of best Swedish iron, two hundred and thirty feet, at 13*s.* 4*d.* -	153	6	8
Fourth. Machine capstan, complete -	65	0	0
Fifth. Patent right confined to one set of railways, but may be transported to any other situation, as the whole apparatus can be stowed in little bulk - - - - -	200	0	0
	958	6	8
Mason's work, or piles and foundations, say (but this depends on the nature of the soil)	150	0	0
	1108	6	8

The patent right is one hundred pounds where the vessel is one of one hundred tons; and one hundred and fifty pounds for one of two hundred tons. In this description, our object has been to convey to general readers, some idea of the construction and advantages of Mr. Morton's slip. Those who take a deeper interest in matters of this kind, will of course see the apparatus actually at work. This invention has received the approbation of many persons competent to judge of its merits: indeed there can scarcely be a doubt that it must prove eminently advantageous in repairing ships; and also in other cases where no docks or secure harbour for shipping can be either made or found. We should think that it might be introduced with advantage at the Cape of Good Hope.

To CHARLES SMITH, *of Piccadilly, London, for an Improvement in the Method or Form of making up superfine Oil and Water Colours for Drawing, Painting, and other Purposes.*

THIS new invention consists in enclosing all kinds of superfine oil, and water colours in wood, or any other material, so as to become new invented coloured pencils, to be worked by being dipped in liquid, and not become dry and chalky, like those before known: such pencils being capable of making perfectly transparent or opaque drawings on paper, wood, linen, or any other material, by being wetted or moistened with water, oil, varnish, spirit, or any other liquid matter. It consists also in making them take wood or other grooves similar to those used for black lead pencils; and enclosing in them after the manner of black lead for black lead pencils, all kinds of the best superfine water or oil colours by whomsoever made capable of being so enclosed; and which deliver their tints on any material when moistened as above described; and in fastening or gluing them up of whatsoever material they may be made; and in rounding, and finishing them so as to appear and be like a regular coloured drawing pencil, fit for the purpose of drawing or painting on any material with colours; and in japanning or colouring each pencil outside of the same tint it contains within, after the manner of pencils.

Inrolled, June, 1819.

To WILLIAM GELDART, JOHN SERVANT, *and* JONATHAN HOWGATE, *of Leeds, Yorkshire, for a Method of* [illegible] *Houses, and other Build-* [illegible]

[illegible] are to produce the increased [illegible] drying-houses by means of the [illegible] which is effected by passing the [illegible] from a boiler to the under side of the [illegible] house, or other building intended to [illegible]

[illegible] is not essentially different in its [illegible] parts, from the common arrangement, [illegible] in any convenient place nearly con- [illegible] drying-house, with steam pipes, cocks, [illegible] injection and condensing pipes and vessels [illegible] as convenience may dictate.

[illegible] the building is to be of flag stones, tiles or [illegible] some substance equally capable of conduct- [illegible] supported upon joists of iron, stone, brick, or [illegible] suitable material.

[illegible] steam from the boiler is conveyed through a pipe [illegible] under side of the floor, and branched off so as to [illegible] itself between all the joists, the partitions be- [illegible] the floor and the joist forming boxes both steam [illegible] tight.

[illegible] is a dry well provided under the floor to be [illegible] with loose stones for the purpose of receiving the condensed vapour.

Enrolled, November, 1819.

[illegible], *Kent, for an In-* [illegible] *Manufacture of Boots* [illegible]

[illegible] object of the patentee is to form the legs of boots without seams, for which purpose he proposes that the thigh of the beast should be flayed without cutting open and dressed, or curried upon blocks: the boot top upon the same principle is to be made of the shoulder prepared in like manner.

Inrolled, December, 1819.

It is much to be regretted that inventors so often neglect to avail themselves of the experience and practical knowledge of those who are conversant with inventions and patents: in the present instance a patent has been granted for manufacturing boot legs without seams, though the same invention has been already the subject of a patent of many years standing.

To JOHN THOMAS BARRY, *of Plough-court, Lombard-street, London, for an Invention of an improved Apparatus for Distillation, Evaporation, and Exsiccation, and for the Preparation of Colours.*

THIS invention consists first, in combining a still with a condenser and refrigerator, by which means operations may be carried on in *vacuo* without the application of an air-pump. A pipe from a boiler conveys the steam to a globular condensing vessel which is placed in a tub for the purpose of being surrounded with water in order to produce condensation. The neck of a retort passes from the pipe into the still, but in which the progress of the steam is intercepted by a stop cock. A retort also conducts from the still to the refrigerator, and, through it, into a globular receiver, which refrigerator and receiver are both placed in a cistern, and immersed in cold water.

The communication of the still with the condenser being cut off by means of the stop cock, the condenser is filled with steam, and then the steam cock shuts, when, by pouring cold water upon the external part of the vessel, a condensation is produced within, and a consequent partial vacuum. The stop cock of the retort is then opened, and a portion of the air of the still, refrigerator, and receiver, admitted into the condenser. The stop cock is again closed, and the communication with the still is cut off. The steam is now admitted into the condenser as before, by the opening of the steam cock; and when closed again the vessel is cooled by the external application of cold water, a condensation is produced, and a partial vacuum in the vessel. The stop cock is again opened, and a farther portion of the air extracted from the still, refrigerator, and receiver: this operation is continued until the still, refrigerator, and receiver are sufficiently exhausted, which is indicated by a mercurial syphon connected to one of the retorts.

The still is then put in action, and distillation performed in *vacuo;* but in order to observe the operation within, so that the material shall not boil over into the condenser or receiver, two openings, or windows, are made in the still head and covered with glass, about an inch in diameter each for the purpose of admitting light and looking into the still.

The distilled fluid then passes through the retort into the refrigerator, by which it is cooled, and runs in the receiver below. By the operation of distillation being performed in *vacuo*, the products will be found more pure and perfect, than when exposed to the atmosphere, which not only weakens many of the products, but alters their appearance and quality.

The patentee claims, secondly, the novel and peculiar construction of his refrigerator, which is formed nearly square by the attachment of two plates of tinned copper placed parallel together, at about half an inch distant, and supported from collapsing when exhausted by small nobs soldered within, at one inch apart, so that the entire pressure of the external atmosphere upon the exhausted refrigerator is resisted by the numerous points at which the plates rest against each other.

Inrolled, November, 1819.

To WILLIAM MILWARD, *of Eaton, Bucks, for Improvements on Skaites, and in fixing them on the Feet.*

THE improvement claimed by the patentee consists in attaching the skait-iron to the sole of the shoe or boot, instead of a wooden sole to be strapped on to the foot, as heretofore.

In order to render the shoe or boot sufficiently firm to hold the skait-iron, a thin plate of metal is worked into, and concealed under the sole leather, and staples attached thereto, for the purpose of receiving the skait-iron, which is of the ordinary form, or variable at pleasure.

The attachment of the skait-iron to the sole of the shoe or boot, is effected by means of a staple at the toe-part, into which a dove-tailed notch in the iron is intended to fall and fit tightly, the other end of the iron fastening to the heel part by means of a finger screw, so that the skait-iron can be removed with much less trouble, than that by which the ordinary skait would be unstrapped and taken off; when the shoe or boot will have the appearance of a common one, and the wearer be enabled to walk in it without the slightest inconvenience.

Besides which, the patentee is of opinion that this mode of fastening the skait immediately to the sole of the shoe, will be found a much more pleasant and secure attachment, than that of strapping the wooden sole which attaches the skait to the foot, as commonly done.

Inrolled, May, 1819.

To WILLIAM STYLES, *of Islington, in the County of Middlesex, Gentleman, for an Invention of Improvements in Machinery for sifting Cinders, and disengaging the Cinders so sifted into a convenient Receptacle, which Machinery is also applicable to other useful Purposes.*

THIS invention consists of a bin or box containing a sieve to be agitated by means of a handle or lever, with sliders, rollers, springs, &c.

The sieve being suspended upon swinging pivots, is moved in a manner similar to the sieves of winnowing machines, by a crank or cranks connected to the handle, and its motion may be regulated by a fly-wheel.

The construction of the various parts of the machinery has no particular novelty, except in its adaptation to the purpose for which the patentee has applied it, and in that capacity may be found convenient and useful in preventing the waste of cinders, with very little labour or trouble, and performing the operation with cleanliness.

There is a contrivance by means of a sliding lever and handle, to discharge the contents of the sieve after it has been sifted, into a hod or scuttle, placed for that purpose in a convenient situation below, but distinct and partitioned off from the dust, which is confined within the bin or box, and prevented from escaping or flying about.

The machine is also applicable to the sifting of various kinds of seed; and in a variety of other situations in which the operation of sifting may be found useful.

Inrolled, January, 1819.

To ALEXANDER HADDON, *of Aberdeen, Scotland, for an improved Manufacture of Carpeting.*

THE intention of this patentee is to substitute flax and hemp in the place of wool, for the manufacturing of carpets, either combined together or separately adapted for that purpose.

The modes of manufacturing these substances into carpeting, seem not materially to differ from the present known process, where wool is used; and there does not appear to be any new feature set forth in the specification relative to carpet-making, except the adaptation of the articles above, viz. flax and hemp, to that purpose, instead of wool as heretofore.

The claim therefore of monopoly, to which the patentee is entitled, will be considered as confined to the exclusive use of flax and hemp for the fabrication of carpets, and not to any new process in the method of preparing that article, or any new mode of weaving carpets in general.

Inrolled, September, 1819.

To SARAH THOMSON, *of Rotherhithe, for an Invention of new or improved Machinery, and the further Application of known Principles by new Combinations, for the purpose of cutting Cork, first into Slips, then into Squares, and afterwards in rounding the same, communicated to her by her late Husband* ARCHIBALD THOMSON, *and her late Son* ALEXANDER THOMSON.

THE first object proposed, viz. that of cutting cork into slips is effected by fixing the cork upon the sliding bed of an engine, and bringing it, by a progressive motion, under the action of a circular knife, by which it is cut into slips of equal widths: the nature or construction of a machine to be used for this purpose, may be easily conceived, as it possesses no new mechanical feature, except in its application to cutting cork. The motion communicated to the knife, by hand, steam, horse, or other power, moves at the same time the bed also, which carries the cork to be cut.

The second part of the invention, viz. that for separating the cork into square pieces, after it has been cut in slips as above, is effected by a moving bed as before, upon which the slips are to be placed, and submitted to the action of a cutting lever, which may be regulated to chop the cork into pieces of any given length.

The third part of the invention, viz. that for rounding or finishing the corks, consists of an engine to which is attached a circular knife that turns vertically, and a carriage or frame on its side that revolves upon an axle horizontally. This carriage, or frame, contains several pairs of clamps, intended respectively to hold a piece of the square cut cork, by pressing it at the ends, and carrying it lengthways perpendicularly; which clamps are contrived to have a spindle motion, by means of a pinion at the lower end of their axles, working into a cog-wheel.

The machinery thus arranged, is put in motion by means of bands and drum-wheels, or any other contrivance which may be found most eligible; and at the same time that the circular knife revolves vertically, the frame containing the clamps with the pieces of cork turns horizontally, bringing the corks one by one up to the edge of the knife, when to render each piece of cork cylindrical, the clamps as above described revolve upon their axes, independently of their carriage, by which means the whole circumference of the cork is brought under the action of the knife, and the superfluous parts are uniformly pared off, and the cork finished smooth and cylindrical.

Inrolled, November, 1819.

To Joseph Cliseld Daniell, *of Frome, Somerset, for certain Improvements in dressing Woollen Cloth; also in preparing and using Wire Cards, as applicable to that Purpose.*

First, for grinding or pointing the ends of the wire teeth of cards, to be used for the purpose of raising the pile on woollen cloth, in the operation of dressing, it is requisite to render the points of the wires as sharp or picked as possible: the patentee effects this object by means of a cylindrical roller of about eighteen inches diameter, revolving upon its axis, and something longer than the width of the card intended to be sharpened. This cylindrical roller is to be covered or banded round with wire cards, or what is commonly called filleting, and between the interstices of the teeth or wires, a composition of grease and fine emery powder is to be laid. When the roller is thus charged, it is put in motion by means of a pulley or otherwise, at the rate of about two hundred revolutions per minute.

The card intended to be ground, is nailed upon a board for the purpose of distending it, with handles at the back, by which it is held with the wire toward the cylinder; the ends of the wire are then immersed in the grease and emery as the cylinder revolves, and the board traversed to the right and left, until, by the operation, the points are rendered extremely fine.

The improvement or difference in this invention from the common process of pointing, consists in covering the roller with wire cards holding the composition of grease and emery, which being easily displaced, as the ends of the wires are drawn through it, grinds them to sharp points instead of wedges, which would be the case by the ordinary strickle roller, or by steel rollers cut as a file or grindstone, or by a cylinder covered with emery glued on to its surface.

Here a digression may not be thought unnecessary. It is well known that the ill effects arising to workmen from the present mode of pointing needles, is a subject of serious regret: the method above recommended by the patentee, may, perhaps, with considerable success, be adopted for that purpose.

The second principle claimed by the patentee, is the application or use of the above pointed cards, to the purpose of dressing or raising the pile on woollen cloth, as above stated, either attached to gig mills, or used by hand.

The third principle claimed by the patentee, is that of heating woollen cloth, after the wool or pile has been raised as above, and before the cloth has been racked or dried, for the purpose of producing a fair and durable lustre, closing the texture of the cloth, laying the nap smooth, and giving it a soft feel to the hand, which is performed by binding the cloth tight upon a roller while it is wet, and immersing the roller and cloth in a boiler filled with water, which is to be gradually heated; and, when the cloth is hot completely through, it is to be taken out and remain until cold, before it is unrolled to be rocked and dried, in which operation care must be taken to avoid ruffling the face of the cloth.

Inrolled, September, 1819.

Original Communications.

An Account of a Telescope of a new and singular Construction, invented by the Right Hon. the late Earl STANHOPE. *By Mr.* SAMUEL VARLEY.

PERHAPS no one instrument ever yet invented, possesses so much of the marvellous as this of his lordship's, or excited more surprise in every one who heard him speak of it; (which he frequently did both in town and country) and more particularly in those who saw its peculiar effects.

As I am the only person living who perfectly understand its construction, and the manner of using it, perhaps a description from me may be thought worthy a place in this miscellany of science.

That the late Earl Stanhope devoted the greater part of his time and attention to mechanics, during a pretty long life, with a zeal, industry, and perseverance, which, if ever equalled, could not be exceeded, is pretty well known;

but more particularly to those who were honoured with his confidence and more familiar acquaintance: to myself most of all, who, for sixteen years, was his lordship's constant attendant in all his experiments, provided the greatest part of his apparatus, and superintended the construction thereof, when made by others, either in town or country; and also personally assisted in making the various experiments, which occupied his lordship's time and attention. During the last four years of his lordship's life, he was mostly engaged in making experiments in optics, which he prosecuted with the most unremitting attention day and night, with the view of producing a telescope of a peculiar construction, which, for size, magnifying power and properties, would so far exceed any that had been made before, that even Herschell's would have sunk into insignificance.

Whether, if his life had been spared, he could have realized his great design, cannot now be determined; but, if he had lived a few months longer, he would have put it to the test, as he was constructing one upon a smaller scale, capable of being applied to astronomical purposes: for hitherto it had only been used to view land objects, as the whole apparatus necessary for its being used for astronomical purposes, was not yet complete. This would have given his scheme a fair trial, and have pointed out whether any alteration in the construction would have been necessary.

When I say upon a smaller scale, I mean in comparison with the extremely large one which he intended, and for which every thing was preparing, and in great forwardness; yet this small one, as he called it, was of dimensions sufficient to have admitted a magnifying power of seven or eight hundred times.

From an almost innumerable set of experiments made with it upon terrestrial objects, the results were such as to inspire his lordship with the utmost confidence of success, and very much astonished a number of his friends who witnessed its extraordinary effects. This is certain, that no expense, time, or trouble would have been spared, to complete his vast design; and as his lordship possessed an almost inexhaustible fund of invention, joined to the most determined perseverance in whatever he undertook, as well as great resources both pecuniary and mental, he was well qualified for such an undertaking; added to all this, he was never discouraged at difficulties, however great, but on the contrary, they seemed to inspire him with more ardour and resolution. This I have constantly observed, whenever difficulties occurred; and such instances were not few. I shall now relate some of the experiments.

And first let it be observed, that this extraordinary telescope is of the reflecting kind, and nearer to those of the Newtonian construction than any others; consisting (like them) of two metals and two glasses only; but very different in structure, in effect, and in the manner of taking observations.

First, the observer may sit or stand in a warm room, and, without ever changing his position, observe more than one half of the horizon, the object appearing directly before him, however elevated it may be in the heavens; thus continuing in the easiest posture and without ever being exposed to the open air. No other telescope affords these very desirable advantages.

In other telescopes, the smallness of the eye-glasses are very objectionable where highly magnifying powers are wanted; in compound eye-pieces particularly, (which are by far the best) it is next to impossible to obtain them small enough. In the Stanhope telescope, the greatest powers can be obtained with glasses of not less than two inches focus; which are of a size much more manageable in every respect. Opticians will, I believe, think this impossible, but I can assure them it is strictly true.

In other telescopes, the eye-piece requires a very nice adjustment, as well on account of the difference in eyes, as the greater or less distance of the objects themselves; but in this instrument no such nicety was required: for with the same situation of the eye-piece, objects placed at sixty yards, or any where in his lordship's extensive park, or upon the Vine at Sevenoaks, which I think is a distance of three miles at least, were distinctly seen; nor did it require to be adjusted afresh for different observers; and, what is more extraordinary, he would pull out or push in the eye-piece more than twelve inches without producing any perceptible indistinctness: his lordship thought this of great importance.

But what will surprise opticians the most, is the result of the last experiment which his lordship ever made, on an evening in January, 1816, after the sun was set. The object was a watch-dial placed at the distance of sixty yards from the telescopes; and when it was too dark to see the dial at all with a Gregorian telescope of six inches aperture, and which had a metal of an excellent composition, with his telescope, having the aperture reduced to three quarters of an inch, and charged with a power of three hundred times, his lordship as well as myself, and several others who were present, could read the figures, and the small dots between the minute figures on the dials, the experiment being tried upon several: the dials appeared as though some artificial light had been thrown upon them, when, in truth, there was no such thing, nor any other artifice used. Now, in the common construction of telescopes, metals reflect, and glass transmits light in proportion to their areas, or as the square of their aperture, which in this case was as sixty-four to one; so that the effect was produced by the peculiar construction of the instrument, and can be attributed to no other cause. His lordship intended to have made his metallic reflectors six feet in diameter; and I had built a furnace, and was preparing moulds for that purpose; but this last experiment caused him to alter his mind, and as he was going to leave Chevening the next day, he gave me orders to make moulds of smaller dimensions, one of twelve, and one of twenty-four inches diameter, being persuaded that, perhaps, the smallest would be quite sufficient. The moulds were made; but, alas! his lordship never returned in sufficient health to make use of them, and the metals were not cast. If the telescope had retained the above-mentioned properties when used for viewing the heavenly bodies, it would have been the greatest discovery ever made in this department of science. In order to put it to the test, his lordship ordered me to put to the one, with which the last experiment was made, such additions as were necessary for making the trial, but his death put a stop to all further proceedings, and the experiment was not made.

That I may be better understood in describing this unparalleled instrument, by those who have not made optics their study, and to whom the construction of telescopes is not familiar, it will be necessary to explain the common doctrine of optics. First, the different sorts of rays of light; secondly, the peculiar properties of light; thirdly, the various forms of lenses and specula, and their effects when used singly or combined; fourthly, the construction of telescopes, particularly such as are in general use, with the advantages and disadvantages of each, and in the order in which they were invented. And lastly, to give a minute description of Lord Stanhope's invention in the state in which it was at his lordship's death, and what it was intended to have been, if his life had been sufficiently prolonged, for the accomplishment of his vast design; which was no less than the construction of a telescope of three hundred and eighty-four feet in length, with reflectors six feet in diameter. A vast design indeed! but such was his original intention.

Rays of light are of three sorts;—either first parallel rays which proceed equally distant from each other, as A B C D, Plate II. fig. 1st; or, secondly, converging rays, which all tend to one point F, after passing through the glass B C; or, thirdly, diverging rays which proceed from any point F, diverging or going wider from each other towards E G.

Of the properties of light, I may first mention two, as matter of curiosity; first, its tenuity, or the smallness of its particles, so that it can pass through some of the hardest and most solid bodies in nature, such as glass and diamond, with facility and without much loss.

Secondly, that it moves in straight lines, and with an inconceivable velocity, coming from the sun to us, in about eight minutes of time, a distance of ninety-five millions of miles.

The most interesting properties of light are its refrangibility and reflectibility, without which we could not have had either telescope or microscope, or any other optical instrument whatever. By the first of these, the rays of light are made to deviate from their direct course in passing through transparent bodies, or mediums whose surfaces are inclined to each other, (as is the case in all lenses) and to take other directions which will be explained in treating of the properties of the various forms of lenses that are in use.

By the second of these, light is reflected from the surface of opaque bodies.

The reflection of light may be well explained by the effects produced by a concave mirror; and in all cases by knowing that the angles of incidence and reflection are constantly equal. Suppose, A A, Fig. 7th, a concave mirror, and C, the center of the sphere of which it is a portion. Then, C A, will be the radius of concavity, draw C V, which will be the axis of the concave. Suppose, P P, to be two parallel rays of light, incident upon the concave at different distances from its vertex, V, as V 1 and V 2, lines drawn from C to either of these two points, will be perpendicular to the surface of the concave, and to which the angles of incidence and reflection are constantly equal. Upon this principle the ray P 1, will be reflected to F, making the angle, P 1 C, equal to C 1 F; so that V F will be the focal distance for the semi-aperture, V 1; on the other side, P 2 will be reflected to f, the angles, P 2 C, being equal to C 2 f: V f being the focal distance for the semi-aperture V 2. This constitutes the error by figure in reflecting telescopes.

The inflection of light is another property noticed by Sir Isaac Newton, and others; but I do not know that any one proved its bad effects, or attempted to avoid them in the construction of optical instruments, before Lord Stanhope. I believe it does not admit of correction, but may in some measure be avoided as in his lordship's telescope. I shall explain what it is, as follows: If the edge of a razor A, Fig. 8, be made to approach a parallel beam of light, B. Fig. 8, the light will spread or become diverging as in the figure, much like what takes place in passing through a concave lens. This inflection takes place whenever light passes near any solid body, however small. In passing by the edges of the little metals, and the stems which support them on the Newtonian, Gregorian, and Cassegrain telescopes, it does much harm, as his lordship has proved by many experiments.

The refraction of light can well be accounted for by the laws of attraction; but I do not know that inflection has been yet accounted for at all.

If any one has a desire to see more upon this subject, he may consult Newton's Optics, Gravesande's Elements, and Martin's New Elements of Optics, &c. and the Encyclopædia Britannica, Art. Optics.

Lenses for common use are made of glass, ground and polished to a proper figure, and are of divers forms; as, First, Fig. 2, a plano-convex lens; consisting of one plane, and the other a convex or spherical surface. Secondly, a double convex, Fig. 3, both surfaces being of a convex or spherical form. Thirdly, a plano-concave lens with one plane, the other a spherically hollow, or concave surface, Fig. 4. Fourthly, a double concave, both surfaces being spherically concave, Fig. 5. Fifthly, A Meniscus, which has one surface concave and the other convex, Fig. 6. The properties of the foregoing of these five lenses follow in order:

A Plano-Convex. If parallel rays A B, C D, (Fig. 2.) fall on the convex side of a plano-convex lens, B D, they will, on passing through, be converged to a focus F, at nearly the distance of the diameter H F, of the sphere of which the lens is a segment, or at the distance of twice the radius H C of the sphere.

A Double Convex. If parallel rays A B C D (Fig. 3) fall on a double and equally convex lens, B D, they will, on passing through, be convened to a focus F, nearly at the centre of the sphere of convexity.

A Plano-Concave. If parallel rays, A B C D, (Fig. 4,) fall on a plano-concave lens B D, they will, on passing through, be made to diverge towards I K L as if they came from a point F, nearly at the distance of a diameter of the sphere of concavity F H, which point F, is called the virtual focus of the lens.

A Double Concave. Parallel rays are made to diverge much more by passing through a double concave lens, which, if it be equally concave on both sides, will cause them so to diverge as if they came nearly from the centre C of the sphere of concavity, Fig. 5.

A Meniscus Lens, participates of the properties as well as the forms of both the convex and concave lenses; and when the radius of convexity is shorter than the radius of concavity, it will have its focus at a greater distance from the lens than if it had been a plano-convex; but as this sort of lens is now nearly, if not entirely out of use, I need not say more about it in this place, although I shall have occasion to mention it again in the description of Lord Stanhope's Telescope, Fig. 6.

There is an error in lenses and specula, see Fig. 7,—arising from their spherical figure, called the aberration by figure to distinguish it from another error, caused by the different refrangibility of the rays of light, and called the error by colour: their bad effects have very much limited the perfection of optical instruments, particularly telescopes, which are proportionally improved as those errors are corrected: to remove them quite, is impossible by any means yet known. To lessen and correct them, and bring telescopes to the degree of perfection to which they are now brought, has exercised the patient industry, talent, and intellect of the greatest men that ever lived: and it has been but by slow degrees they have been brought to their present state of perfection. Much has been done already; as we can now have telescopes of 5, 6, or 7 feet in length, equal and, in many respects, superior to those formerly made of 120, 200, or 300 feet long.

To make myself better understood in explaining the two sorts of errors which I have mentioned above, I will begin with that which is caused by the spherical figure of the glasses; suppose it to be a plano-convex, and parallel rays to fall upon its convex side from the sun or any other vastly distant object, so that, as to sense, they may be esteemed parallel amongst themselves, in passing through the glass or lens they will be refracted and become converging rays; and, meeting and crossing one another in some point in the axis of the lens, will form an image or picture of any distant object from which they came; this image may be seen pendant in the air, in an inverted position, yet very perfect; this is to be understood only of such rays as fall upon the lens near its centre: for such other rays, which fall upon the same lens, at a greater distance from its centre, will meet in a point nearer to the lens, and form another image; and other images will be formed nearer and nearer to the lens, as the rays fall upon it more and more distant from its centre or axis, thus causing image after image to be formed towards the lens, or between it and the first mentioned image. This constitutes what is called the error by figure, which produces so much confusion, that the object glasses for telescopes can admit of being but of small diameters or apertures compared to their focal distance; so that an object-glass for a telescope of 120 feet will not admit of more than about six inches aperture with sufficient distinctness; and, of course, too little light to bear a very high degree of magnifying power. The quantity of light transmitted through glass or reflected by metals, being as the square of the aperture, so that an aperture twice as large will give four times the quantity of light, and will bear twice the magnifying power.

It would swell this article too much to give a history of the various attempts made to remedy this defect, before Newton's discovery of the error by colour; or the dispersion of a beam of light into rays of seven different colours whenever it is made to pass through glasses where their two surfaces are inclined to each other, however small the angle of inclination may be: this dispersion is greater, the more the surfaces of the glasses are inclined to each other, and in a pretty high proportion.

Although this dispersion is small near the centre, it increases so fast, at greater distances, as soon to become very injurious by tinging the images and fringing their edges with all the colours of the rainbow, and very much adds to the confusion occasioned by the error by figure. For the rays of light being of different colours, and each coloured ray differing in refrangibility as well as colour, and consisting of red, orange, yellow, green, blue, indigo, and violet coloured rays, the violet rays being the most refrangible, and the red the least, the violet coloured light will converge most, and form a first image, and all the others in succession in the inverse order in which they are written: so there will be seven images, and of as many different colours, in succession. However we may lament the injury that this property in light occasions in the use of telescopes, yet it is to this very property, that we are indebted for all the rich variety of colour which we see in natural bodies, as well as in the works of art; and by which also we view objects through telescopes in their true colours. Can any person see this wonderful contrivance in nature, and the structure of the human eye, and then say that we owe it all to blind chance?

Thus far I have explained the properties of single lenses only: but as it is to their combined effects that we owe the very existence, as well as perfection of all optical instruments, it will be proper to give a short explanation of these also. We have seen that the rays of light are converged to a focus, by being made to pass through a convex lens; but if another convex lens be interposed between it and its focus, they will converge more; so that an image will be formed nearer to the lens, and by this means the error by figure will be less, and the distinctness greater than by a single lens. If a concave lens be so interposed, the convergency will be diminished; and, if properly placed, entirely destroyed, and the rays will proceed parallel, as will be seen in the construction of the Galilean telescope. If a second convex lens be added, beyond the focus of the first, as far as is equal to its own focal distance, the rays of light will also proceed parallel; but if this second lens be placed nearer to the first than the sum of their two foci, the rays will diverge: for example, suppose two lenses, of two inch focal distance each, are placed at four inches distance from each other, and parallel rays are made to fall upon either of them, and to proceed to the other, they would be parallel after having passed through the latter; but if placed at only three inches distance, the rays will be diverging.

It will be seen of what great use these combinations are in the construction of telescopes; and that it is to a particular combination of two lenses that we owe the great superiority of the Huygenian eye-piece above all others; as, in that, both the errors by figure and colour, are so much corrected, as to give the largest field of view, the greatest distinctness and magnifying power, with the least possible loss of light.

When the immortal Newton discovered the dispersion of light into so many coloured rays, an end being put to all hopes of bringing refracting telescopes to any tolerable degree of perfection, causing that great man to turn his attention to the doctrine of reflection, where he would have only the error by figure to contend with; and which is so much less in reflection, that he was enabled to give an aperture of six inches to a telescope of five feet in length.* This telescope was compared with one made by Huygens, of 120 feet long, belonging to the Royal Society, (which I believe is still in their possession), and was thought excellent of the kind. The comparison was made by a Mr. Pond upon the planet Saturn. He gave the preference to the Newtonian construction, in the state in which it then was; but which has been much improved since that time in many respects.

This discovery of the error by colour, by Sir Isaac Newton, gave birth to the excellent telescope that still bears his name, and will hand it down to the latest posterity. The Newtonian telescope is at this time greatly esteemed for astronomical purposes, though not convenient for land objects.

About the same time, or soon after, a reflecting telescope, was invented by Dr. Gregory, which still bears his name, and is now in the greatset estimation. This telescope was much improved by Mr. Short, of

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* I am in possession of one of the above dimensions, which I believe was made by that great man himself. I can say that I have had great pleasure in the use of it for some years, though it is not my own; and the person to whom it belonged being dead, I believe it is now to be disposed of.

Edinburgh, who brought it into almost general use. Later opticians, by almost unwearied diligence, have brought it to the highest degree of perfection possible, by improving the composition of the metal, and by working the object metal into a parabolic figure, or making it a portion of the parabola, instead of a portion of a sphere, as in the Newtonian construction; and by these means they have almost, if not altogether, destroyed the error by figure, as respects the reflecting part: but still, as glasses are used in the eye-piece, reflecting telescopes will in some degree partake of that error, and render the middle of the field of view more distinct than the edges. For there are no spherical lenses which have not this aberration by figure more or less; the double and equally convex ones have it the most, the plano-convex less; but the least of all are those where the radius of convexity of the two sides is as six to one. Opticians have contrived to diminish it, by making use of two lenses instead of one, in the construction of their eye-pieces; some by placing two close together. It is to the great Huygens that we are indebted for the best construction, by using two glasses whose foci are as three to one. Fig. 12.

Suppose one of three-inch focus, with another of one inch, placed at the distance of two inches from each other; their magnifying powers will be equal to a single lens of 1½ inch focus. In this case planos are mostly used, with their plain sides next the eye. The largest, which is placed furthest from the eye, is called the field glass, because it amplifies the field of view; that next the eye is called the eye-glass; and these thus conjoined, constitute the Huygenian eye-piece. But this construction becomes difficult where high magnifying power is wanted, owing to the smallness of the eye-glass, which, in a five feet Newtonian, would require to be only of one-tenth of an inch focus for a power of 400 times. By these means telescopes of the same aperture and power of magnifying distant objects, are reduced to half the length of those of the Newtonian construction, with the further advantage of seeing the objects erect, and in their natural positions, instead of seeing them inverted and sideways as in the Newtonian telescope, where you look in at the side of the instrument instead of the end; but in the Gregorian structure, you see the objects which are directly before you.

There was another construction, invented by a Monsieur Cassegrain, which shortens reflectors still more; but, as it inverts the objects, it has not been much in use. I made one of them of six inches aperture, and thirty in length, and thought it excellent for astronomical purposes; it bore a magnifying power of 400 very well.

After this, the late Mr. Dollond invented the achromatic telescope, a refractor, in which the errors by figure and colour are corrected so much, as to bring it almost into universal use and estimation. Unfortunately for this fine invention, which does so much credit to the author, it is found hitherto impossible to procure glass, which has the requisite properties for making them good, and of a sufficient size to admit of their being made with large apertures, very seldom so large as five inches; while metals can be had of almost any size. Herschel's great telescope is four feet in diameter; Lord Stanhope intended his to be six feet.

Telescopes may be considered, therefore, as of two distinct classes, and of different constructions in each, and are either refracting or reflecting telescopes. The first class comprises all those where the effects are produced by the refraction of light in passing through lenses only. Of the second class are all those where the principal effects are produced by the reflection of light from the polished surface of metals, although glasses are used in the construction of the eye-pieces. So that, strictly speaking, there is no such thing as a reflecting telescope in use; such a one has been attempted, and a patent taken out for that purpose by Mr. Dixon about forty years ago; but the scheme did not succeed, owing to the great loss of light after four or five reflections. Yet this very scheme had previously been much extolled in print by a great writer on optics, Mr. Benjamin Martin.

A telescope was proposed about fifty years ago, and much spoken of by a French writer at that time, consisting of one object-glass only, without any eye-glass; but, as we have not heard any more of it, I suppose it did not answer his expectations.

The Galilean telescope is the most simple of any that has been in use, consisting of an object-glass, and one concave eye-glass; and fewer than these there cannot be for viewing and magnifying any distant object. For the object-glass only serves to form an image of the object at its focus, which is to be viewed by an eye-glass so placed that the rays of light may come to the eye parallel, or nearly so, to have a distinct view of the object, and this is requisite in all optical instruments. This condition is obtained by placing the concave eye-glass at its virtual focus, within that of the object-glass, by which the object may be seen distinctly and in its natural position; but the field of view is too small for general purposes; on that account, it is but seldom used. A larger field may be obtained by placing a convex lens outside of the focus of the object-glass, so that their foci may coincide or fall upon the same point; but, in this case, the image will appear inverted, and therefore not proper for land-objects. Though for astronomical purposes, this telescope has been much in use, particularly after the field of view had been made more large and distinct, by substituting the Huygenian eye-piece instead of the single lens. I have used one of those of forty feet in length: its powers were considerable, but the difficulty of observing with it was so great, that I soon laid it aside.

For terrestrial purposes, the four-glass telescopes were much esteemed, and the six-glass ones still more; but all these have given way to later and better constructions, and therefore I need not give a more minute account of them here, but proceed to a particular description of such as are now much improved and in higher estimation, illustrating this description with diagrams.

The first which I shall mention, is the Newtonian telescope, Fig. 9, far, very far, superior to any other made prior to its invention. This telescope is simple in its construction, and, for astronomical purposes, extremely convenient; as the observer can stand in the same upright and easy posture, however much the object is elevated above him, even to the zenith, or directly over his head. It is constructed as follows: at one end of the tube A B C D, is placed the great metal A B, spherically concave, whose focal distance is nearly the whole length of the tube, where it would form an image I, of the object O, placed directly before the open end C D, but cannot be viewed there, because the head would be before the open end of the tube and intercept the light. To obviate this, there is a small oval metal, M, placed at an angle of forty-five degrees to the axis of the tube to intercept the reflected cone of light A I B, and change its direction to i, where the image will be made, and which may be viewed by the eye-piece H, here represented of the Huygenian construction, for which an opening or slit is made in the side of the tube to admit the light, and also the stem S to pass through. This stem is firmly attached to a plate of metal made to slide in a dovetail, having a hole near the middle into which the eye-piece is screwed; the stem S is so placed, that a line drawn through the centre of the glasses and axis of the eye-piece will fall upon the middle of the polished surface of the oval metal, which, being fixed to the top of the stem, may, with the glasses, be moved in a line parallel to the axis of the tube, in order to adjust the instrument to procure distinct vision.

This metal ought to be perfectly flat on its polished side; but to obtain any thing perfectly flat, or straight, or round, or square, or spherical, or any other figure, is not within the reach of human industry, as I may perhaps shew more at large in some future communication; assigning the reasons why such perfection is not to be expected.

Fig. 10. represents the Gregorian reflecting telescope, which consists of a tube A B C D. At the end C D, the great metal is placed which must be concave, and as nearly as possible worked to a portion of the parabola, instead of that of a sphere; otherwise, (as in this construction, the focal distance of the great metal, for the same aperture is not more than half that of the Newtonian, and is often made much less than half) the error by figure, would be too great to admit of distinct vision, for the reason mentioned before. Suppose its focus to be at F, where the image of a very distant object will be formed, but inverted in respect to the object O; this image is now to be considered as an object placed before a small metal M, situated at a little more than its own focal distance from F, and, being spherically concave, will reflect the light back again, through a hole made for that purpose in the great metal, and form a second image X, beyond the back of the great metal, and in an erect position to be viewed by the Huygenian eye-piece H. This little metal is supported upon a stem, as in the Newtonian telescope; only, in this case, it is placed with its face parallel to the great metal, instead of being inclined as in the former. The dove-tail slide, which supports it, is moved by a screw placed on the outside of the telescope for the purpose of moving the little metal to a proper distance from the great one, in order to procure distinct vision.

The Cassegrain Telescope, differs from the Gregorian, only in making the little metal convex, instead of concave, and placing it nearly at its focal distance from F, Fig. 10, and between that and the great metal, that distance being always half the radius of the sphere, of which it is a portion. Suppose, in both cases, their focus to be three inches, then the Cassegrain telescope would be six inches shorter than the Gregorian; and this is the shortest construction of a telescope that has been invented; but, notwithstanding this desirable advantage, as the objects appear inverted this telescope is but little in use, and only for astronomical purposes.

Having mentioned the achromatic telescope, it may be expected that I should now give its theory, construction, and advantages; but, having discovered a defect in glass which has hitherto escaped the notice of opticians, and which materially affects the use of that valuable instrument, and also prevents us from obtaining some very desirable articles, one of which is the prismatic lens, I shall defer this part of the subject to my next communication, (wishing to make some experiments thereon) and to introduce it after the description of Lord Stanhope's telescope.

There are some men who shrink from the smallest difficulties, and others who think that *the greatest* may be overcome by patience and perseverance. It was thought a great thing, when Mr. Short had so far improved reflecting telescopes, by giving the parabolic figure to his metals, when their diameters were a fifth or a sixth of their foci; and, notwithstanding this increased diameter, preserving great distinctness. This procured him great fame, and a fortune. Since his time, patient industry has enabled opticians to go much further, and to obtain equal perfection of vision in their telescopes; the apertures of which were but a fourth of the focal distance of the great metal.

As a proof that Lord Stanhope thought no difficulties too great to be overcome, I shall give the following instance: his lordship had a scheme that would require a brass tube of five feet long, eight inches in diameter, and a quarter of an inch in thickness. This tube was to have had one hundred thousand holes pierced in it, of one twentieth of an inch diameter, and as many steel pins fitted into them, in such a manner that any number of them could be made to stand upright, or to take an inclined position at pleasure, as though they moved upon hinges; at the same time the tube to be continually turning round upon its axis. Every thing was contrived and arranged ready for execution, and the whole committed to writing, as all his inventions were, lest any part of them should be forgotten.

With such a mind, no wonder that his lordship found courage enough to undertake his gigantic telescope; and notwithstanding I give it that term, yet, if we except the size of his reflectors, it would have been simple, and manageable, compared to Herschel's large one, which requires three men to assist in the movement of it, while his lordship's required no more than the turning of a screw, which could be done by the finger and thumb of an observer, with the greatest ease. Every part was so well contrived as to give great credit to his inventive powers, which he possessed in a greater degree than any person that I ever knew, although I have been conversant with inventive men for more than forty years.

His instrument was not only a telescope, but a transit and equatorial instrument also. And so perfect and permanent, that the ground upon which it was erected, must give way, to produce any derangement after it was once fixed in its place: its radius, being no less than one hundred and ninety-two feet, afforded the most accurate means for its adjustment.

[*To be concluded in our next.*]

On the Effects of Vegetation upon the Atmosphere.

To the Editor of the Journal of Arts and Sciences.

SIR,

IT is some time since I communicated the results of some of my experiments on vegetation, to the Philosophical Magazine (see Vol. 50,) in which I flatter myself that I demonstrated, that *germination*, *vegetation*, and the *ripening* of fruit, all deteriorated the air of the atmosphere, by imparting to it a portion of their carbon, which, uniting with the oxygen of the atmosphere, produced carbonic acid gas; and which, I believe, is almost invariably the case during vegetable life; but, as in the animal economy, this chemical operation is slower in some subjects than in others, so it is with vegetables. But if vegetables like animals impart carbon to the air, whence do they derive it? Are we to suppose that, like them, the *food* which they imbibe by their *roots* is capable of affording it, in the same manner as it is imagined that the food of animals supplies carbonaceous matter to the blood? If this be the case, we must expect to find that manures in general, (I say in general, because a heavy soil might be improved by the addition of fine gravel, or sand, which mechanically divides the earth, and admits of a more free access of the oxygen of the atmosphere) possess carbonaceous matter, and in such a state that its carbon is capable of uniting with either atmospherical moisture, and decomposing it, by uniting with *its* oxygen; or, that it decomposes the air of the atmosphere by combining with *its* oxygen, by which it is converted into carbonic acid gas: for I can scarcely imagine that *solid* carbon, as it exists in manures, is capable of being taken up by the capillary vessels of the roots of plants.

But as this is a branch of physics, which ought to be supported by direct experiments, I procured some compost manure, just as it was about to be scattered over a field; and, with a view of ascertaining whether it converted the oxygen of the atmosphere into carbonic acid, I placed a portion of it under a glass jar, (the capacity of which was about six quarts) with its mouth immersed in mercury, in order to cut off any communication with the external air; this was exposed to all the vicissitudes of day and night, for a week in the month of July; the result of which was, that nearly the whole of the oxygen of the atmospherical air contained in the jar, was converted into carbonic acid gas. Now, as it is well known, that a strong affinity exists between water and this gas, there could be no doubt, but that the rain, or the artificial watering of the field or garden, would take up the carbonic acid, and convey it to the roots of the plants, which, by their capillary attraction, would take up the water so impregnated, and select the carbonaceous matter for the increase of the plant: hence we see the origin of the carbon of vegetable bodies, and, in my opinion, the true theory of manures. For, let the farmer or gardener cease to manure their grounds, and we all know what a scanty crop will be the result of such neglect; the cause of which is, there would not be sufficient convertible carbon in the soil, to support a good crop. But, to demonstrate this idea still further, I procured a portion of the mould, from the same field from whence I collected the above manure, and treated it in the same manner; but its carbonizing effects on the atmosphere, were by no means so great. In fact, agreeable to the above theory, it would have been absurd to suppose such could have been the case: for if the manure, which had been converted into mould, *had* supplied vegetation with a great portion of its carbon, it could not be expected to produce so great an effect on the atmosphere in the latter, as in the former state.

From this theory of manures, and of the physiology of vegetation, we can discover the utility of ploughing and harrowing, beyond that of mere mechanical action; for when the upper surface of the earth is in a great measure exhausted of its carbon by the vegetating process, that portion of carbon which has been carried below the surface by the percolation of water, and, in a great measure, defended from the action of the atmosphere, is, by ploughing and harrowing,* again returned to the surface, and exposed to the united action of water and air, by which a remaining portion of its carbon is converted into a fit food for the vegetable economy. On the above principles, united with a mechanical division of the soil, depends in a great measure the theory of manures. And from observations which I have made, I am much inclined to believe that the earth ought not to be very compact; for then it prevents the root of the vegetable from expanding, which precludes the possibility of its collecting sufficient food for its growth: hence it is that we frequently observe in those gardens where the spade is but little used although well manured, a contracted growth of vegetables. But if any one should object to the above theory, and say if the vegetable selects the carbon from the carbonic acid, produced by the assigned cause, ought not its oxygen to be set at liberty in the state of gas? This, at first sight, may appear reasonable; but if we consider the quantity of various acids which many vegetables contain, and which owe their acidity to oxygen, and also the alkali, which forms a prominent feature in their composition, we shall immediately discover a sufficient demand for all the oxygen of the carbonic acid, without its being liberated in the state of gas. In fact, I do conceive, that there are certain secreting organs in the vegetable economy, whose office it is to decompose, and select from their food, the constituents for the various parts of their composition, such as sugar, acids, gum, alkali, &c. &c.

I am, Sir, yours, &c.

J. TATUM.

Dorset Street,
Salisbury Square.

On a new Process of Engraving on Metal and Stone.

To the Editor of the Journal of Arts and Sciences.

SIR,

IN consequence of reading in the Edinburgh Philosophical Journal an account of the Process of Engraving on Copper Blocks in alto relievo by Mr. Lizars,* I am induced to send you a few observations on the experiments I made five years ago with a view to improve the present method of engraving on wood.

On referring to some of the finest specimens by Albert Durer and others, it will appear that the strokes are crossed with as much freedom and accuracy as is to be found in the most careful etching on copper, although it is well known that they were printed by a method exactly the reverse; or, in other words, they were printed with the types. Now to produce the same effect by the most opposite means, has long been a desideratum with the curious, because the advantages resulting from it are infinite.

No one at all acquainted with engraving will, I apprehend, believe, that it is possible to unite all the advantages of the one in the other; yet as one can be used where the other cannot, and as they each have their advantages, all that can be done is to make the impression from the block resemble, as nearly as possible, the impression from the plate. The history of engraving will shew, that block engraving is of the most ancient date; and that it was practised centuries ago in a manner, of which we, at present, are totally ignorant.

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* See our Miscellaneous Intelligence.—Edit.

It may not be amiss here to describe the present mode of engraving on wood, in order to shew the difficulty of effecting what has been done with so much apparent ease in the earliest period of the art. The design is usually traced or drawn on a piece of box wood, made perfectly smooth; and every line is either drawn with a pen or pencil, and the interval between each is, with a graver, cut away. Now as every stroke with the graver makes a light, it will, I think, appear evident, that the labour of leaving the dark lines to cross each other must be immense.*

To obviate this difficulty, various modes have been tried with more or less success; and Mr. Lizars appears to be the first who has *published* the result of his experiments. He says, "I have found, from experience, that the best mode of proceeding is, to lay an etching ground upon the copper, as in the ordinary operation of etching; to remove the first lines, or rather interstices, with the needle, and then to put on the cross-lines with the varnish. Should this cramp the freedom of the artist in some parts, he can easily scrape off the etching ground, and draw those with the varnish.

"Although this discovery must still be considered in its infancy, and very incomplete, yet it is probable that much may be done with it, if proper materials can be found out to work with. It possesses every advantage which common engraving does, and at the same time all the advantages of engraving on wood; and, above all, it enables us to procure as many impressions as can be taken from types. The greatest difficulty to be surmounted, is to obtain a substitute for the varnish, which will flow from a pen or pencil like Indian ink: for as the varnish has a tendency to dry, and get tough in the pencil, the operation is, by this circumstance, very considerably impeded."

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* This difficulty affords the presumption, that the old engravers either used two blocks, or that they worked on metal.

Now, it will appear that the *greatest difficulty* by this mode of proceeding, was, to me, the most easy. From the various experiments I have made, I am induced to agree with Mr. Lizars, in thinking copper the most preferable substance to work on; because it appears, that the aqua fortis acts upon it with more certainty, and is capable of much greater degree of finish than any substance I have yet tried.

My first object was, to discover a method to produce cross lines in every direction, with as much ease as if they were drawn with a pen or pencil; and, for this purpose, I tried a variety of means; and I now take an ordinary copper-plate, lay an etching ground, and trace the subject in the usual way either by passing it through the press, or by tracing with red chalk. I then take a cake of the best vermilion, and rub up a sufficient quantity with tolerably stiff gum water; then, with a crow pen, which I feed with a hair pencil, I draw distinctly every line intended to appear in the print. Having completed my design, without in the least injuring the ground, and being satisfied that it is perfectly dry, I take a small piece of linen rag, dipt in spirits of turpentine, and pass it two or three times, in different directions, over the plate, which immediately dissolves the etching ground which is not covered by the vermilion, and leaves the copper perfectly clean. By these means it will appear obvious that you may preserve what part you wish to finish with the point. After this process, it will be necessary to take off the vermilion, which is easily done either with a sponge or piece of linen rag, dipt in clean water, and passed two or three times over the plate. This leaves the ground with all the lines which were originally drawn with the pen defended from the action of the acid. Should any imperfection appear, it may be easily repaired with ground dissolved in spirits of turpentiné, or with common varnish. It now only remains to be corroded with the aqua fortis, which is done in the ordinary way of etching, except that it requires to be corroded much deeper in the lights. After this process, the advantage of copper over wood is obvious, because it may be re-bit over and over again, until any depth is obtained; and it may also be improved and corrected by the graver. The immense labour required to take away the lights in wood is, by this process, accomplished in a short time by the acid alone; added to which you have all the freedom of the pen, with the advantage of finishing with the point and the graver. I am of opinion, that this mode of engraving may be applied to a variety of purposes where wood blocks are now used; because, from the experiments I have made, I am satisfied that, for many purposes, it will answer perfectly well on stone.

CHARLES PYE.

2, George Street, Euston Square,
Jan. 8th, 1820.

P. S. Some time since I sent to the Society of Arts one of the first experiments I made on copper, which I presume is still to be seen there.

New Method of producing Gas for Illumination from Oil.

To the Editor of the Journal of Arts and Sciences.

SIR,

THE practice of lighting with gas, beginning to be much more appreciated than it was some time back, from its superiority over any other artificial light, and particularly the gas obtained from oil, to which subject I have principally turned my attention, in order to bring both the gas and its manufacturer's apparatus to a simple and perfect state; permit me, through your Journal of Arts and Sciences, to convey to the public a slight sketch of my apparatus, which will be found so extremely simple, safe, and easily managed, that any ordinary servant will be able to undertake its superintendence.

My apparatus consists of a stove about four feet long, two feet six wide, and three feet high, into which are placed two retorts, connected together by a vent pipe at the back; in the front of the stove, upon one of the retorts, stands a hollow column, supporting an open oil vessel, with a cock and regulating index, through which the oil falls into the retort, for the purpose of decomposition; over the other retort stands another hollow column for the exit of the gas.

To this exit column is connected a pipe leading to a condenser which receives the gas; and in this condenser is deposited the residuum of the oil which has escaped decomposition.

From the condensing vessel passes a pipe leading to a worm immersed in a vessel of water, as a refrigerator, with a receiver at the bottom, intended to catch any further portion of the undecomposed oil which may have passed over.

To this worm is attached a pipe leading to another vessel called a monitor, half filled with water, which receives the gas, and upon its bubbling up, and rising to the upper part of the vessel, passes on through an exit pipe to the gas holder, situate at any convenient distance.

The easy method of generating gas by this apparatus will be seen by the following description of its action.

The fire being made in the stove, and the decomposing materials (which may be cinders, coke, loam, broken bricks, or a variety of other absorbent substances) placed in the retorts, the cups are luted and the fire raised, till the retorts are of a bright red heat. The oil being in a vessel above, is let down through the cock, regulated by an index, into the first retort, through which it passes, by means of the vent pipe, into the second retort, decomposing as it proceeds, from whence the gas rises up the exit column, and through the pipe into the condenser: from the condenser the gas passes through the worm, as above, and so on to the monitor, and thence to the gas holder.

It may be remarked that I have not mentioned any mode of purification: the fact is, that if the volatile oil which passes over be properly detained in the vessels as above, no further purification is necessary, the gas being immediately rendered in a perfect state for combustion, with scarcely any smell, (should it by accident be allowed to escape unburned) and produces a light in brilliancy and pleasantness, very much superior to any that can be produced by coal gas.

I have one of these apparatus in use from which I supply my manufactory and dwelling with light, and have upwards of forty burners in use nightly.

I have made experiments upon all the oils which I have been able to procure both animal and vegetable, and find some of them to produce the most brilliant artificial light which I ever saw: the process only needs to be better known to be more in general use.

Should a more enlarged detail and further description of the apparatus, and the results of my experiments on the various sorts of oils, upon which much of my time and attention have been devoted, be worthy a place in your Journal, I should feel pleasure in giving you the same on a future occasion.*

I am, Sir, yours, &c.
JAMES DE VILLE.

367, *Strand, Jan.* 20, 1820.

P. S. Besides my own manufactory and dwelling, I have fitted up several gentlemen's mansions in the country and various manufactories with the oil gas, to whom I can refer.

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* We shall be glad to receive further details.—Ed.

On Ventilation.

To the Editor of the Journal of Arts and Sciences.

Sir,

In my official capacity as Master of Hackney Workhouse, I have long observed the necessity of a simple and effectual mode of ventilation, there being so much prejudice and reluctance existing among the lower orders of society against admitting fresh air into the rooms or wards where they reside. I have, at length, succeeded in an invention to draw off the foul air from the wards;

when fresh or pure air will, of course, insinuate itself from every opening or crevice. This contrivance appears applicable to various other situations, such as small chapels and meeting-houses, crowded rooms, theatres, prisons, ships, mines, &c. or any other close place where a number of people are assembled together.

My plan is as follows:—In the ceiling of the room intended to be ventilated, I make an aperture of from six to nine inches, (or if necessary, still larger, according to the magnitude of the place, and number of persons likely to assemble); into this aperture is introduced a hopper or funnel, having its mouth level or flush with the ceiling; to the upper end of this funnel is attached a pipe or tube, with an elbow made of any convenient substance, or material, which pipe is carried on between the flooring joists towards the fire-place of an upper room, (or to a stove situated above, which may be applied to the purpose of ventilation); the pipe is then turned upwards and made to pass into a cast-iron box attached to the stove, or close to the cheek, or behind the back of the grate nearly contiguous to the fire; it is then carried on some distance up the chimney, and terminated in a situation where it is least likely for the soot to fall into it.

It will be now obvious that the air in the cast-iron box, or that part of the pipe which is brought into close connection with the fire, by the heat will become considerably rarified and ascend the chimney; of course the air of the lower part of the pipe will pass on with a rapid current to restore the equilibrium; and, taking its supply of air from the hopper or funnel, before described, situate in the ceiling of the room beneath, the lighter, most impure and deteriorated part of the atmosphere of the lower room floating at or near the ceiling, will be drawn off, and a most effectual ventilation be by these means produced.

Ocular proof may be given by putting a lighted candle near the opening in the ceiling, when the flame will dart in a direction with the tunnel, as from the action of a blow-pipe. Secondly, if a fly of a small ventilator be held to the opening it will whirl round with great velocity. I must also add, that, having adopted this contrivance to such wards in Hackney Workhouse, as were formerly obnoxious from stagnant vapors, not the least smell is now to be perceived in the rooms.

With respect to hospitals, or prisons, I should recommend a stove to be fixed on the upper floor of the building, and pipes conveyed from the ceiling of each ward to the stove, as above named, which may be so constructed that the pipe or receiver shall pass through the fire, and be conveyed up the flue above the building; this would effectually carry off those unpleasant smells incident to sick wards, and contagion be completely destroyed by passing through the fire.

To men of war, hospital-ships, and convict hulks, this mode of ventilation may be of the utmost consequence. The cooking fire-place or ship stoves are admirably calculated for the adaptation of this improvement, which may be added to each stove, now in use, at a very trifling expense. Those who are in the habit of attending hospital-ships, and ships of war, and have experienced the unpleasant task of going below after one or two hundred persons had slept between decks, will see the propriety of introducing this mode of ventilation.

I think this contrivance would be found applicable to coal mines, and is calculated to prevent some fatal accidents occasioned by foul air. If a pipe were conveyed from the most convenient part of the mine to the furnace of the steam engine above, so that the action of the fire should rarify the upper end of the pipe, the foul air would be continually carried off, and pure air descend by the shaft to supply its place; this would greatly add to the comfort and health of the miners, as well as to the prevention of some of those fatal accidents of which we so frequently hear.

I may also venture to say that the dry rot so destructive in many houses might also, by proper methods of arrangement, be cured by this mode of ventilation.

Should the foregoing observations merit a place in your publication, and prove to be beneficial to society, my end will be fully answered, having no other motive in view than that of rendering my assistance toward the public good.

Yours, &c.

GEORGE TYER.

Homerton, December 3, 1819.

Novel Inventions.

On Mr. Perkins's Plan for preventing the Forgery of Bank Notes.

THE ease with which the notes of the Bank of England may be imitated, being a great temptation to the lower class of engravers to commit forgeries, the Society of Arts were induced enter into an investigation of the best means (if any existed) of shielding the public from this species of depredation, and of obtaining a paper currency upon the validity of which the public might with confidence rely.

With this view the Society drew together a greater association of talent both in science and art than ever assembled upon any subject of investigation before; on which occasion it was boldly declared, that unless the Bank of England issued notes of a superior style of engraving, no one could know that they were genuine, for the very indifferent workmanship upon their present notes might be easily copied by every engraver of moderate ability; and the water mark in the paper (at present their greatest security) might be so tolerably well imitated as to pass undiscovered.

Various plans for the improvement of the engraving and paper of Bank of England notes have been from time to time offered to the Bank Directors, but none have been found without objections incompatible with its adoption. The great desideratum, however, sought by the Society of Arts, viz. that of multiplying plates which contained specimens of the finest productions of the first artists, is now fully obtained by the introduction of Messrs. PERKINS and FAIRMAN's ingenious process of Bank note engraving. These gentlemen have brought their system to such high perfection, that scarcely any farther improvement can be expected or desired.

In order to produce a Bank note plate, a vignette, or other subject, is to be engraved upon a block of steel prepared by a peculiar process, and rendered so extremely soft as to be capable of being cut with ease by the same graver, as copper; when the subject is finished, the block of steel is hardened without injury to the engraving, and being placed in a rolling engine, a small cylinder of soft steel is worked upon the block until the cylinder has received the impression of the engraved block in relievo. This cylinder, after being hardened, becomes a tool, whereby to impress as many steel or copper plates as may be required.

By this process writing and every description of ornamental engraving may be first executed on blocks, and afterwards associated together, and transferred into one cylinder, which cylinder is to be the tool, whereby any number of steel or copper plates are to be impressed.

To give a more enlarged detail of the respective parts of this ingenious process is unnecessary in the present article, as we hope in our next (or a very early number) to be favoured with Messrs. Perkins and Fairman's own communication, accompanied by specimens of their very beautiful plates.

We have only to assure our readers that the method proposed is fully competent to every thing which could be required of it; that the process has transferred the most delicate and highly finished subjects from the graver of Messrs. Heath, Finden, Holl, Pye, &c.; and even such minute writing as the Lord's Prayer, the Creed, and the Ten Commandments, executed within the space of a silver penny, by Mr. Benjamin Davis, in all of which the subject has been perfectly transferred with the distinctness of the original.

An Account of the Life Rafts of Lieutenants Cook *and* Rogers *for preserving shipwrecked Persons.*

Among the variety of inventions for affording assistance to shipwrecked persons, the Life Rafts of Lieutenant Cook and Lieutenant Rogers appear to merit particular attention.

Lieutenant Cook proposes a sheet of canvas attached at the ends to two strong laths or spars, and distended by two other laths or spars passed through loops on the selvage, and joined at the corners with ropes forming a square frame. In the canvas are to be made a number of holes sufficiently large for a man's body to pass through; and under these holes are to be strong straps or bands for the men to sit astride upon.

In the event of the vessel filling with water, this canvas is unfolded and framed together, when four or more empty water casks are to be attached, one to each corner or round the frame, and the raft launched: this is capable of carrying a number of men who cannot be washed off their seat, where they are to remain quiet until picked up or drifted on shore.

For merchant vessels it would be found under perilous circumstances extremely applicable, and capable of supporting a small number of men in perfect safety. One of seven feet square would carry thirteen men, and one of four feet six would carry five men; the apparatus may be kept on board folded up, and will occupy very little room among any part of the stowage.

It is to be regretted, that though many ingenious plans have been invented for the purpose of saving lives in the event of shipwreck, yet they have seldom been adopted by mariners: this may be attributed to the aversion which sailors always feel in admitting apparatus on board, which is not applicable to some other useful purpose.

To obviate this prejudice, Lieutenant Rogers suggests the construction of a life raft by the combination of various parts of the ship's furniture, viz. of the butts, slings, capstan bars, gratings, or hatches and handspikes lashed together with small ropes.

The raft is proposed to be constructed apon deck in a few minutes in the following manner:

Lay two capstan bars or small spars parallel at about six feet apart, upon which place three gratings or hatches and lash them together; then put two more capstan bars or spars athwart the ends of the former on each side of the gratings, and secure them with good lashings, by which a square platform will be constructed for the men to stand on; then let one or more empty casks be lashed to each side of the platform for the purpose of assisting its buoyancy.

While the above is framing together on another part of the deck, let four more spars or capstan bars be attached, so as to form a square frame to be placed upon the casks and firmly braced down, forming a rail round the platform within which the men may sit or stand without danger of being washed off.

As a further security hand-spikes may be set up at each corner of the raft, and ropes and canvas, if necessary, spread for shelter; or even a sail may be hoisted.

Though under some circumstances any attempt to save the crew may prove abortive, yet this description of raft is so easily constructed that it may be found of great advantage; and several instances are within our knowledge in which such a raft would have effectually saved the lives of many seamen where vessels have grounded upon shoals.

It might be useful if captains were, at leisure times, to exercise a few hands in the construction of such a raft, the materials being always at hand, by which, in the moment of danger, an easy refuge would be afforded.

The Society of Arts thought so highly of these inventions that they presented their gold medal to each of the above gentlemen, who are Lieutenants in the Royal Navy. See Transactions of the Society of Arts, Vol. XXXVII. about to be published.

A Method of preventing the Mischief arising from the Explosion of Gunpowder Mills, invented by Mr. JAMES MONK.

WITH very laudable feelings of humanity, the Society of Arts some time since offered a premium of one hundred guineas, for the invention of an effectual method of preventing the explosion of gunpowder mills.

To accomplish this desirable object in its fullest extent is, perhaps, beyond the reach of human precaution; but any approximation to such a security must be highly desirable, when we remember how many such accidents have of late years occurred attended with the most extensive and dreadful consequences.

Mr. James Monk, superintendent of the gunpowder works near Tunbridge, Kent, has invented a method of reducing the risk of explosion, and confining its consequences within the building where the accident happens.

The mills at Tunbridge are erected in detached houses scattered over the extensive grounds; and their communication is intercepted as much as possible, by broad plantations of willow, in order to prevent an explosion from communicating to any other part of the works.

In each of these houses there are two distinct and detached sets of mill-work, turned by a water-wheel situated between them. The object of Mr. Monk is in the event of an explosion, to extinguish the fire instantly by a fall of water, and at the same time to inundate the adjoining mill, by which a further explosion is prevented.

The apparatus consists of two long bars forming a double lever extending through both mills, and connected by a joint in the middle over the water wheel. To the extremity of each of these levers, is attached a broad hollow pyramidical hood of thin sheet iron, hanging immediately over the mill; and as near as possible to the same situation is placed a vessel containing a considerable quantity of water.

In the event of an explosion in one of the mills the force of the explosion raises the broad hollow pyramidical hood, or blower as it is called, which lifts the bar or lever attached to it.

The bottom of the vessel containing water above mentioned, has a large valve to which a chain from the lever is connected, and when the lever, as above, is lifted by the explosion, the valve of the water vessel is opened, and its contents let fall instantly upon the mill work, at the same time (the levers of both mills being connected together, and hanging upon pivots or fulcrums) the rising of the head or blower at one end, will depress the joint in the middle, and cause the other end of the lever to rise, opening also the valve of the water vessel over the second mill, and consequently inundating it before any fire can communicate.

It is not the first explosion which is most to be dreaded in one of these mills, as it never kindles the whole of the powder, but the second or third explosion of the same mill, caused by the ignition of the coagulated parts of the composition which adhere to the stones, and the loose dusty particles lodged upon the machinery and floor, which completely burns and destroys the whole apparatus, and sends the flakes of fire flying in all directions.

By the immediate descent of the water a second explosion is prevented; and by the water also falling upon the combustible materials of the adjoining mill, the mischief is arrested before any considerable damage is done, beyond that of blowing off the roof, and, perhaps, tearing away some of the weather boarding of that mill where the accident first took place.

It appears that this apparatus, which was erected three or four years ago, has been instrumental in preserving the mills several times, when partial explosions have taken place; and also that the lives of persons have been saved, who must otherwise from their situation have fallen a sacrifice.

The Society of Arts have presented Mr. Monk with their silver medal and twenty guineas, for the communication of this invention. A particular account of the apparatus, with a plate representing all its parts, will be found in Vol. XXXVII. of their Transactions, about to be published.

A new Reflecting Microscope.

A CATOPTRICAL microscope has been invented by Professor Amici, of Modena, differing from others by placing the object to be viewed on the outside of the tube (which is one inch in diameter, and twelve inches long) instead of placing it in the centre and before the object metal, by which he can more effectually throw light upon the objects to be viewed. There is an opening made in the side of the tube, to permit the light to fall upon a small metal placed diagonally in the axis of the tube, which reflects it upon the object metal placed at one end, and by that it is reflected back to the eye-glasses placed at the other end of the tube. Our limits at present do not permit a more detailed account, nor such observations as we should otherwise be inclined to make.

Its advantages, according to the account of the inventor, are, that the observer can examine the object in a horizontal position—that the different degrees of magnifying power can be easily changed—that the objects are always kept at the same distance from the body of the microscope—that the light may be brought to bear upon all sides of the object—that there is no dispersion of the light, consequently the objects appear of their natural colour—that the diameter of the mirror being large, a greater distinctness will follow—and, lastly, that the degree of magnifying power may be carried much higher than upon the refracting principle.

It appears, that the inventor has also adapted this instrument to the purposes of a camera lucida, which will be of great advantage in taking accurate drawings of the object upon any scale.

We believe that Messrs. Dollond have just finished one of these instruments.

Miscellaneous, Scientific Intelligence.

GREAT BRITAIN.

Institutions.

THE establishment of Institutions for the diffusion of Literature, Science, and the Arts, in Great Britain, forms a distinguishing characteristic of the commencement of the present century. The four institutions of the metropolis in particular, viz. the *Royal Institution*, the *London Institution*, the *Surry Institution*, and the *Russel Institution*, with the various lectures which have from time to time been given in them, by some of the most eminent literary and scientific characters of the age, exhibit features so striking and peculiar, as to render the present era in the facilities of literary and scientific communication, superior to any past period. By these academies, a stimulus to the acquisition of knowledge has been widely diffused; nor have the ARTS failed to partake of a share of that impulsion which the human mind has latterly received by the collision of kindred spirits, and that generous emulation for excellence which these societies, in connexion with others in London and elsewhere, in Great Britain, are chiefly instrumental in exciting. This rapid expansion of knowledge, affords, amidst other prospects, not of the most cheering kind, a consolation both to the practical and speculative philosopher, of no trifling kind. Nor are these efforts of the scientific world in mighty London likely to abate. In Medicine, in Chemistry, Surgery, Anatomy, Mechanics, and in every branch of knowledge, lectures are now giving, or about to be given, at the various Institutions and other places that convey to listening, admiring and learning audiences, that information which it is the pride of the professors to diffuse.

The operations for the season commenced at the Royal Institution, on the 11th of January, when Mr. Millington began a Course of Lectures, in Experimental Philosophy to be continued twice a week; Mr. Brande resumes, of course, his Chemical Illustrations; Mr. Campbell gives a Series of Lectures on Poetry; A Course of Lectures on Botany, by Sir J. E. Smith; and another on Architecture, by J. Soane, Esq. complete the whole.

At the London Institution, Dr. Birkbeck is now giving a Course of Lectures on Natural Philosophy, consisting of Astronomy, Optics, Hydrostatics, and Mechanics; Mr. Millington, on Experimental Philosophy; Mr. Phillips, on the Elements of Chemistry, and its connection with the Arts; and Sir J. E. Smith, on Botany.

At the Surry Institution, Lectures have been already given by Mr. Accum, on Chemistry, and Mr. Hazlitt, on the Literature of the Age of Elizabeth; and Dr. Crotch is about to commence Lectures on Music; and Mr. Elmes, on Architecture.

The Royal Society.

This Society, which in age and dignity is the first in Great Britain, and we may add in the world, has published during the last year, Three Parts of its Transactions. We shall give occasional notices of such of the papers as appear most deserving of attention.

Sir Everard Home has, in the Croonian lecture (Trans. Part 1, for 1819), treated of the *conversion of pus into granulations of new flesh.* In the last volume he endeavoured to explain how coagulated blood became vascular. He informs us that carbonic acid gas is extricated at the moment of coagulation; that this gas gradually lengthens into a tube which is immediately covered by a coat, and thus converted into a blood vessel. He thinks that the same process goes on during the conversion of pus into granulations, or new flesh. Pus, he tells us, is analogous to the serum of the blood. At first it contains no globules, but they gradually make their appearance in it, whether it remains at the surface of the sore, or be removed upon some other surface. The paper is taken up in describing the appearances which are perceived upon the surface of a healing sore when left for about a quarter of an hour exposed to the atmosphere. The coating of pus co-agulates, globules of carbonic acid gas make their appearances in it; these are speedily converted into numerous anastomosing vessels filled with blood.

Fine Arts.

That the *Fine Arts* are in great activity in Great Britain, needs no other proof than the number of candidates for public favour and encouragement in the various departments, which we find, by the last number of the Jour- of the Fine Arts, are as follow :

Painters, 591 ; Sculptors, 58; Architects, 93 ; Engravers in Line, 83 ; Engravers in Chalk or Line, and Stipple mixed, 30; Mezzotinto Engravers, 15 ; Aquatinta Engravers, 27 ; Engravers on Wood, 21.

Forming a total of upwards of NINE HUNDRED ARTISTS, who are constantly pouring the efforts of their pencils, their chisels, and their gravers, into the laps of not only the inhabitants of these islands, but more or less, of the whole civilized world ; and conveying, at the same time, information and amusement to the most distant climes, and to the most remote posterity !!

Society of Arts,

Amidst the general eagerness for the acquisition and diffusion of knowledge, both of the practical, agricultural, and mechanical kind, continues to preserve the character for which it has long been distinguished. It has lately offered premiums for "cultivating land with potatoes ;" "for improving land lying waste ;" "for comparative cultivation of land by spade and ordinary husbandry ;" "for comparative advantages of manures ;" "for encreasing the force of steam engines with less fuel ;" "for preventing the emission of dense smoke from the chimnies of steam engines, breweries, &c. ;" "for the cheapest method of purifying inflammable gas prepared from coal ;" "for an innoxious substitute for white lead, as a basis for paint ;" "for preventing wrought iron from rust ;" "for the discovery of the cause of dry rot in timber, and a remedy for it;" "for printers' ink;" "for the best composition fit for the finest copper-plate printing;" "for the natural history of any county in the united kingdom;" "for the full historical engraving on wood or metal blocks;" "for cloth made from hopbines, nettles, &c.;" "for a family mill for grinding corn;" "for a portable corn mill;" "for the most effectual method of supplying water in case of fire, or to prevent or extinguish accidental fires in buildings;" "to prevent accidents arising from stage coaches;" to prevent accidents from the falling of horses with two wheeled carriages, especially on steep declivities;" "for the cheapest and best method of repairing roads;" "for rendering steam engines safer than any now in use;" "for nutmegs, the growth of British Settlements in the West Indies, or on the coast of Africa, or adjacent islands, equal to East India nutmegs;" "for an account of the process employed in India and China in the manufacture of India paper, and in England for copper-plate printing, together with an account of the materials from which it is made." The premium for a substitute for white lead is one hundred guineas; for nutmegs, fifty; and but one of the others, is less than thirty.

Horticultural Society.

We are happy to observe that this society is daily acquiring strength and importance. The increase in its numbers is most remarkable; no less than two hundred and thirty fellows have been elected since May last, exclusively of several foreign and corresponding members. The meetings of this society are now removed from the apartments of the Linnean Society, to a very commodious house, and spacious meeting-room of its own in Regent-street.

Amongst the numerous exhibitions of fruit during the last autumn, was a very remarkable apple grown near Lewes, in Sussex, which weighed twenty-three ounces and three quarters, and measured seventeen inches in circumference.

New Society of Arts at Edinburgh.

We understand that several gentlemen in Edinburgh, have been occupied for a considerable time in establishing a Society for the Promotion of the Mechanical and Useful Arts in Scotland, for rewarding inventions of public utility, and disseminating useful knowledge among the industrious classes of society. A leading object of this society, it is said, will be to rent a hall, for depositing instruments and models of machinery of all kinds: we shall not fail to watch the progress of this institution, and communicate it occasionally to our readers. We most cordially wish it success.

Gauze Veils, as Preservatives from Contagion.

Mr. Bartlett, in Thomson's Annals, has proposed gauze veils as preservatives from contagion. The idea is certainly deserving of serious consideration, more especially as Dr. Uwins, and some other medical gentlemen, consider that they may be adopted with propriety, and probably with effect.

Portable Gas Lamp.

This lamp, invented by Mr. Brande in 1816, consists of a hollow glass globe of adequate thickness, and surmounted by a stop-cock and burner resting upon and communicating with a square hollow pedestal of sheet copper. The glass globe is fitted with a brass cap at the bottom firmly screwed into the copper box, and communicating with it by an aperture in the bottom of the globe. On one side of the copper box is a screw-hole with a valve opening inwards, to which the condensing syringe is attached for the purpose of forcing in the carburetted hydrogen. At the top of the globe is a brass cap surmounted by a stop-cock of very small bore opening into the chamber, to which the burners are attached.

A new Style of Engraving, invented by Mr. LIZARS.

In common engraving upon copper, the desired effect is produced by making incisions upon the copper-plate with a steel instrument of an angular shape, which incisions are filled with printing ink and transferred to the paper by the pressure of a roller which is passed over its surface. There is another mode of producing these lines or incisions by means of diluted nitrous acid, which is well known, and in which the impression is taken in the same way. *Mr. Lizars'* new mode of engraving is done upon a principle exactly the reverse: for, instead of the subject being cut into the copper, it is the interstice between these lines which is removed by aquafortis, and the lines are left as the surface, from which the impression is taken by means of a common type printing press instead of a copper-plate press.

This engraving is effected by drawing with turpentine varnish coloured with lamp black, whatever is desired upon the plate, and when the varnish is thoroughly dry, the acid is poured upon it, and the interstice of course removed by its action upon the uncovered part of the copper. If the subject be very full of dark shading, this operation will be performed with little risk or accident, and with the removal of very little of the interstice between the lines; but, if the distance between the lines be great, the risk and difficulty are very much increased; and it will be requisite to cut away the parts which surround the lines with a graver, in order to prevent the dabber with the printing ink from reaching the bottom, and thus producing a blurred impression. It is obvious, therefore, that the more the plate is covered with work, the less risk will there be in the preparation of it with the acid after the subject is drawn; and the less trouble will there be in removing the interstice, if any, from those places where there is a little shading. The operation will be facilitated by etching out the first line with the common etching-needle, and afterwards putting on the cross line with the varnish. The best mode of proceeding is to lay an etching ground upon the copper as in the ordinary operation of etching, to remove the first lines or rather interstices with the needle, and then to put on the cross lines with the varnish.

Although this discovery is in its infancy, it is probable that much may be done with it, if proper materials can be found out to work with. It possesses every advantage which common engraving does, and at the same time all the advantages of engraving on wood; and, above all, it enables us to procure as many impressions as can be taken from printing types. The greatest difficulty is in finding a suitable varnish or a substitute for it. *Mr. Lizars* has used several: he found the best was common turpentine varnish. Of the metals he has also used lead, pewter, type-metal, zinc and brass, with various success, but he has found copper superior to them all.

New Patents Sealed, in 1820.

To John Oldham, of South Cumberland Street, Dublin, Esq. for certain further Improvements on his former Patent of the 10th of October, 1817, for an Improvement or Improvements in the Mode of Propelling Ships and Vessels on Seas, Rivers, and Canals, by the Agency of Steam.—Sealed 15th of January.—Six months for Inrolment.

To Joseph Main, of Bagnio Court, Newgate Street, London, Gent. for an improved Method of Preparing and Spinning Wool, Cotton, Silk, Flax, Fur, and all other fibrous Substances.—Sealed 15th of January.—Six months for Inrolment.

To James Thom and William Allen, of Wells Street, London, Piano Forte Makers, for certain Improvements on Piano Fortes.—Sealed 15th of January.—Two months for Inrolment.

To John Leiberecht Steinhauser, of Moffat Terrace, City Road, London, for an Improvement on Portable Lanterns and Lamps.—Sealed 15th of January.—Two months for Inrolment.

To Daniel Treadwell, Citizen of the United States of America, but now of Newman's Court, Cornhill, London, Engineer, for certain Improvements in the construction of Printing Presses.—Sealed 25th of January.—Six months for Inrolment.

To Marc Isambard Brunel, of Chelsea, Engineer, for certain Improvements in the making of Stereotype Plates. —Sealed 25th of January.—Six months for Inrolment.

To Phillips London, of Cannon Street, in the City of London, Chemist, for a method of destroying or decomposing the offensive vapour arising from animal and vegetable matter.—Sealed 25th January.—Two months for Inrolment.

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No. II.

Recent Patents.

To John Grafton, *Engineer of the Gas Light Works, Edinburgh, for a New and Improved Apparatus for purifying Gas used for Illumination.*

THIS improved method of purifying coal-gas for illumination consists of two parts, first, in the combining of certain substances or materials for the purpose of forming an absorbent stratum through which the gas is to pass; and secondly, in the adaptation of certain machinery whereby the gas may be conducted through the stratum and become purified.

The material to be applied for the purpose of taking up the sulphuretted hydrogen, and carbonic acid gases, is a compound of lime with pot or pearl-ashes and charcoal or coke, which is formed by pouring a strongly impregnated solution of pot or pearl-ashes in water upon recently burnt and unslacked lime, the quantity of the solution required being so much as will slack the lime, or cause it to fall to powder. This done, add dry pot or pearl-ashes about one fifth of the whole weight of the lime, and also about one-fourth of charcoal or coke broken into small pieces, the whole to be perfectly mixed together, which composition is to form the absorbent or purifying stratum.

The purifying vessel is divided into several upper and lower compartments, the gas being intended to pass from one to another through the stratum of prepared lime as above compounded, which is spread upon a wire gauze web, extended horizontally through the middle of the vessel. The gas from the retorts passing through the main is introduced into the purifying vessel at one end, when, having filled the first lower compartment, it rises through the stratum of lime, &c. extended over it into the upper compartment, having undergone an operation similar to filtering, by which a chemical union takes place between the slacked lime and the impure parts of the gas. From the upper compartment the gas descends again through the stratum of lime into the second lower compartment, and from thence rises again through the purifying stratum into the second upper compartment, and so on, ascending and descending through strata of lime until it reaches the last chamber, having, by this operation, become purified, whence by a pipe it is conveyed into the gas holder.

The apparatus above alluded to, consists of a long box having several partitions, and at each end of the box on the outside, is attached a cylinder roller, of larger diameter than the depth of the box, over which is extended an endless web, or band made of wire gauze; this endless web lies upon and covers the top of the box lengthwise, passing under it, and upon its upper side over the box is distributed the layer or stratum of the above purifying compound.

This apparatus is inclosed within another box or case, in the upper part of which several sliders are placed, which shut down close upon the wire gauze, at parts intervening between the partitions of the box below, forming the upper compartments above alluded to, between which and the lower compartments the stratum or layer of lime, &c. is upon the wire gauze extended.

It has been above explained that the gas, introduced into one of the lower compartments, ascends through the purifying stratum into the upper compartment, and so on descending and ascending several times through the lime, &c. until it becomes cleansed or purified; hence the stratum of lime, intercepting the first upper and lower compartment, will take up the greatest quantity of the impure matter from the gas and become first saturated, when it will be necessary to remove it and supply its place with a fresh stratum.

This is done by withdrawing the sliders in the upper part of the box by means of racks and pinions attached to each, and then turning the rollers of the wire web, by which operation the lime, &c. will be cast off into a receiver at the end of the vessel. At the same time the supply of fresh purifying materials is admitted at the other end of the vessel, through an opening from a bin which distributes itself over the gauze web, and is levelled and equalized by a scraper fixed for that purpose.

There are also roller brushes under the wire gauze web, to cleanse it from any coagulated portions of the lime which may possibly adhere after the saturated stratum has been removed. It is scarcely necessary to add, that the vessel through which the gas passes must be rendered air-tight during the time that the purifying operation is going on, for which purpose the sliders above mentioned are closely fitted, and the top of the vessel attached with a water channel surrounding it.

Inrolled, December, 1819.

To JOHN SMITH, *of Bermondsey, in the county of Surrey, for an Invention of Improvements in making Arms or Axletrees for Coaches, Carts, and other Wheel Carriages.*

THE object of this improvement is to diminish the friction of the axle against the box of the nave by placing two collets upon the axle which work against the box and lessen the friction by reducing the surface of actual contact.

The box of the nave is made as a hollow cylinder to receive the axle, which axle is reduced in its diameter or thickness about half an inch less than the interior of the box, except at its extremity, which is left as a collet nearly fitting the box; at the shoulder also the axle, which is left as a collet, bears against and nearly fits the box. Thus a groove is formed between the axle and box nearly the whole length of the axle, which groove remains filled with oil while the wheel is in action.

The end of the axle may be also made to work against a rounded projection at the end of the interior of the box, by which the lateral friction is reduced.

The wheel is confined to the axle by a washer working against and behind the shoulder of the axle, which washer is screwed to the nave of the wheel, and by that means the wheel is prevented from coming off.

Inrolled, October, 1819.

To HENRY TRITTON, ESQ. *of Battersea, for the Invention of an Improved Apparatus for Filtration.*

THE design of the patentee is to filter liquors by his new process, with greater facility than has heretofore been found practicable by the usual methods.

To effect this, he proposes exhausting the air from the receiver below, so that the pressure of the atmosphere above acting upon the liquor may tend to force it through the filtre more expeditiously.

The liquor to be filtered is poured into a vessel, in the lower part of which is a strainer or sheet of metal filled with small holes, from the bottom of this vessel below the strainer is a pipe leading into a receiver from which the filtered liquor is drawn off, and attached to this receiver is an air-pump for the purpose of exhausting it.

When the filtering vessel is filled with the liquor, the air-pump in the receiver is put in action, which produces a partial vacuum in the receiver, and in the filtering vessel below the strainer, when, as the air cannot pass through the liquor, the weight of a column of the atmosphere, equal to the surface of the filtering vessel, will act upon the liquor and tend considerably to force it through the filtre.

In order still further to facilitate the operation and extend the surface of filtration, it is proposed to place two or more boxes filled with holes within the filtering vessel, but standing free from the bottom or sides, so that the liquor may be enabled to flow round them on all sides, and pass through to their interior, whence it is intended to descend by pipes into the lower part of the filtering vessel.

In using these filtering boxes it is necessary always to keep the liquor in the filtering vessel sufficiently high to cover them, that they may be perfectly immersed below the surface, otherwise the atmospheric air would be enabled to pass into the exhausted receiver, and the principal object of the patentee herein proposed be completely destroyed.

Inrolled, February, 1820.

To John Scheffer, *of Church-street, Blackfriars-road, Southwark, for an Invention of a Machine or Instrument denominated a Penographic or Writing Instrument.*

This invention is a resorvoir pen intended to supply itself with ink, and consists of a cylindrical metal case, within which the ink is contained in the barrel of a goose quill, covered with a small gut, and stopped tight at one end by a cork, while the other end of the barrel nearest to the nib of the pen, is perforated with a small hole for the purpose of allowing the ink to pass out.

At the nib end a plug of metal is fixed into the cylinder, having a small channel through which the ink passes In this plug is a stop-cock for the purpose of preventing the escape of the ink, and when a fresh supply to the nib is necessary, the fourth finger turns the cock and opens the passage; but in order to force out the ink, the thumb presses upon a stud in the side of the cylinder which compresses the quill reservoir within the cylinder, and discharges the ink through the channel of the metal plug when the stop cock is opened.

The nib is made of a small piece of quill slipped between the plug and the cylindrical case.

Inrolled, January, 1820.

To William Brunton, *of Birmingham, for an Invention of certain Improvements in Steam Engines and Furnaces of Steam Engines, by which a Saving in the Consumption of Fuel is effected, and the Combustion of the Smoke more completely obtained.*

With respect to the saving of fuel the patentee proposes that the fire grate under his boiler be made to revolve horizontally, or rather to travel round under the boiler, by which means he distributes the heat uniformly to every part of the bottom of the boiler, which he conceives will increase its effect, and also supplies the fuel by means of a hopper from above. The improvement in the engine consists of means whereby the piston within the working cylinder may supply itself with oil or other oleaginous matter, and at the same time render the upper and lower ends of the cylinder more completely steam-tight, and impervious to each other.

The fire-grate, (which is supported by an upright spindle or axis, resting in the ash-pit at bottom, and in a cross bar at top,) is contrived to move round horizontally by means of a wheel and pinion upon its axis, connected with the steam engine or any other first mover, which turns it at the rate of about one revolution per minute, for a boiler of about five feet diameter; every time it arrives at a certain point, the channel from the coal hopper is opened and a sufficient quantity of fuel supplied. In order to prevent the air from passing down through the coal hopper, there is a rim (upon which the regulator lies) that descends into a trough for the purpose of forming a water valve or a sand valve. The feeder is as an inverted hopper about nine inches at bottom, and five at top next the feeding hole, the length being equal to half the diameter of the revolving fire-grate; and thus the coal is distributed the whole width of the fire.

There is also a regulator to the feeder connected with the damper, so that if the boiler become too hot, or the pressure of the steam increase, the quantity of coal supplied should be diminished. A bar or scraper is carried round with the fire-grate, for the purpose of gathering the cinders as they fall into the ash-pit below.

The improvement in the piston, intended to prevent the passage of steam, consists in its containing within itself a reservoir of oil, mercury, or other metal, which may be kept in a fusible state at the temperature of 212, and so disposed within the piston, that it is allowed to flow to the sides of the cylinder: when the piston is rising, a portion of steam on the under side passing through a small channel to the mercury, has a tendency to force it between the stuffing into the vacuum above, but, in the descent of the piston, the force of the steam from above impels the mercury back again into the reservoir.

In the event of any of the mercury or oil falling through, there is a channel or groove to receive it at the bottom of the cylinder, and conduct it into a box attached to the cylinder. This box is connected to a vacuum tube, and, when charged with the mercury or oil which has escaped from the reservoir of the piston, the pressure of the steam being allowed by an opening valve to act upon the mercury or oil, forces it up to the top of the cylinder, when it falls on the upper side of the piston, and is forced, as before, between the stuffing and the cylinder into the reservoir.

Inrolled, December, 1819.

To ANTHONY RADFORD STRUTT, *of Makeney, Derbyshire, for certain Improvements in the Construction of Locks and Latches.*

THIS invention is intended as a safeguard against false keys or picklocks, which might be introduced for the purpose of opening the lock, and is so contrived that though the works of the lock are simple, it would be found extremely difficult to produce a counterfeit key sufficiently exact to open it.

The lock consists of a bolt with notches, over which falls a tumbler with pins that drop into these notches, and prevent the bolt from passing without lifting the tumbler; but the safeguard consists in a number of swinging levers hanging over the tumbler, that must be severally raised to a certain point, at which notches cut through them do all coincide, in order that a piece or bar projecting from the tumbler may be allowed to enter these notches or groove, without which the tumbler cannot be raised, nor the bolt be moved. The lock is worked by two keys, called sub-key and master-key.

A circular plate of metal is cut through the centre into five, six, seven, or any number of sectors, which are afterwards connected together by a pivot passing through holes near their points, and attached, in a swinging position, to the lock-plate.

The sub-key is cut into notches or steps on its edge, and introduced into the lock at the side of the sectors; upon being turned, the different steps or notches in the edge of the key lifts the several sectors or levers to different elevations. When in these positions a deep notch or groove is made upon the periphery or edge of all the sectors, for the purpose of permitting a projecting bar connected to a tumbler to enter, which tumbler is raised by the master key in the lower part of the lock, in order to liberate and pass the bolt.

It will be thus obvious that the steps on the edge of the sub-key should be first made to raise the sectors or levers, before the notches or grooves are cut upon their perpihery: for the smallest deviation in the height of any one of the steps upon the key, would place the levers or sectors in such situations, that their respective grooves or notches would not coincide, and, of course, the tumbler (a part of which must enter the groove) could not be raised by the key.

In order to deceive those who may attempt to open the lock by means of picklocks, slight indentations are cut upon the periphery of all the sectors so that their proper positions may not be discovered by any other means than by the original sub-key.

Precisely the same sort of tumbler and levers are applied to latches, and a key introduced, by which the sectors or levers are placed in a position as above, so that the pin or bar upon the tumbler may enter the groove cut in the levers, when the latch may be lifted by a nob, button, or handle.

Inrolled, October, 1819.

To CHRISTOPHER HILTON, *of Darwin, Lancashire, for an Invention of a Process for the Purpose of improving and finishing Manufactured Piece Goods.*

THE object of this invention is to give a beautiful appearance to muslins and such other linen, or cotton manufactures, usually denominated piece goods. It consists in applying a pulp, such as is obtained by grinding cotton or linen for the making of paper, for the purpose of improving the appearance of the piece goods in the last operation of their manufacture called finishing.

The goods being prepared as heretofore by the trade, the pulp mixed with a sufficient quantity of water, is poured upon the muslin or other goods, which are distended upon rollers, and in that situation the water is

allowed to filter through, depositing the pulp upon the goods, into the threads of which it has insinuated itself.

The rollers upon which the muslin is wound, are made to turn so as to carry it forward at the rate of about 12 yards per minute, which time allows the water to drain off and the pulp to form itself. After this it is pressed between two rollers, the top one being covered with a felt or flannel, and supplied with a stream of clean water to prevent the pulp from adhering to the roller.

The pulp is to be well mixed, and diluted with water according to the fineness of the goods to be operated upon, and carefully and evenly floated upon its surface. Any peculiar construction of machinery as applied to this purpose is not specified, but merely the use of pulp as above described to the purpose of stiffening, instead of starch, is herein claimed as a novel invention and matter of patent right.

Inrolled, November, 1819.

To CHARLES ATWOOD, *of Bridge Street, Blackfriars, London, for an invention of a Mode or Modes of manufacturing Mineral Alkali, and Vegetable Alkali, and the application thereof so far as relates to Mineral Alkali, by way of Improvement, or in addition to the Modes heretofore known, or in use, but more particularly in the Manufacture of Kelp.*

THIS invention consists, so far as relates to mineral alkali, in the manufacture thereof, from sulphuret of soda, and so far as relates to vegetable alkali in its manufacture from sulphuret of potash, which is effected by exposing them separately (either in a dry state, or in a solution of water) in proper vessels to the action of carbonic acid, or to an atmosphere of carbonic acid gas, (produced by the combustion of charcoal or any other known mode of producing carbonic acid gas) by the action of which such sulphurets are decomposed and converted into alkalies respectively, by way of improvement, or in addition to the known modes of manufacture of mineral alkali. In this operation it is desirable to expose as large a surface as possible to the action of the acid, which will effect the object with the greatest economy and expedition.

Inrolled, December, 1819.

To JOHN MALAM, *Engineer of the Gas Light Works, Westminster, for an invention of certain Improvements in Steam Engines.*

THE improvements proposed by this patentee in the construction of Rotatory Steam Engines consist of two kinds.

The first is a hollow cylinder or drum, in which the pressure of steam is contrived to drive a leaden piston (as the patentee terms it) round the cylinder; but which piston, by its gravity, always remaining near the lowest part, the steam is impelled upwards against the partition of the cylinder, and consequently forces it round upon its axis.

Two standards support the arms or axles of the revolving cylinder or drum, one of which arm is hollow, having two passages, the one communicating through the leg of the standard to the steam boiler, the other through the other leg to the condenser.

There are three valves in the hollow cylinder or drum, for the purpose of shutting off the steam and forming three distinct compartments; there are also three hollow arms, each leading from the hollow axle into one of these compartments.

There is a heavy block of lead formed exactly to fit the curvature of the drum or hollow cylinder, which block or piston slides completely round the cylinder, the valves falling back into recesses as it passes by them. This block is so well fitted as to prevent the passage of steam between it and the cylinder.

The steam, admitted through the hollow axle and through the hollow arm which leads to the lower compartment where the block or piston lies, not being able to drive the block far from its place forces against the valve, which divides the chambers, and lifts that side of the revolving cylinder carrying it round until the next valve has passed the block or piston, by which time the arm that supplied the steam has passed on so as to open a communication with the condenser or vacuum channel, by which the steam of the chamber becomes condensed. At the same time the second valve having closed the communication with the next chamber, the steam through the hollow arm pours into that chamber, and exerts its expansive force against the block as before, and pressing upward against the valve raises the revolving cylinder.

By these means the cylinder is kept in action, which action, by means of the extended axle of the cylinder, may be communicated as a first mover to other machinery.

The second description of engine has three cylinders, or drums, one within the other; the outer drum is called a jacket or case which is fixed. Between this and the second drum is a passage or flue which passes round the second drum in order to keep it heated, this second drum is also fixed. The third or inner drum only revolves upon its axles, poles, or arms, which pass through metallic stuffings. One of these axles is hollow for the passage of steam, and the other is intended to communicate the motion as a first mover of machinery. The steam enters the chamber from a boiler, and from thence passes by curved channels into compartments formed by oblique partitions in the revolving cylinder or drum, and passes out through small apertures in the periphery of the revolving cylinder into the passage between that and the second drum, which is the condensing passage.

The lower part of the revolving drum, and also of the condensing passage, are charged with a quantity of mercury, or of water, or of fusible metal, such as lead, or bismuth, &c. which is kept in a fluid state by the heat communicated to the inner cylinder through the flue which surrounds the second drum inclosed within the jackets. The steam passing through the entrance pipe as before expressed in one of the axles, occupies the central circular chamber, and from thence flows into one of the compartments above described, formed by curved partitions, where the steam acting against the fluid metal in the lower part, raises that side of the drum, causing it to revolve upon its axis; this brings the entrance to a second chamber from out of the fluid metal in which it was immersed, (and which acted as a valve to the passage) when the steam, acting upon the fluid metal in this chamber, raises that side of the drum still more, that is, continues the revolution. By this time the exit passage of the chamber first mentioned is raised above the level of the fluid metal in the condensing or vacuum passage, (which passage communicates with a condenser) by which the steam in the chamber is condensed; by this time a third chamber begins to fill with steam, the expansion of which, acting against the partitions upwards and the fluid metal below, raises the revolving cylinder still more, while the exit passage of the second mentioned chamber, rising above the level of the fluid metal, liberates and condenses the steam which it contained; the first mentioned chamber having descended as the drum revolved, becomes immersed in and filled with the fluid metal which flowed in as soon as the vacuum was produced. Thus the continued revolution of the inner cylinder or drum is effected, and the rotatory motion of the steam engine communicated by the extended arm or axle to the machinery for which it is designed to be a first mover.

The advantages obtained by these arrangements the patentee informs us are in the absence of a fly wheel by which much room and expense are saved, and also that of a heavy beam; and as the steam is always acting uniformly in this engine, which is not the case in a beam engine, where both steam and time are lost during the change of stroke, he conceives that the most economical and powerful appropriation of steam to the working of machinery may, by these improved engines, be effected.

Inrolled, February, 1819.

To DAVID GORDON, ESQ. *of the City of Edinburgh, and* EDWARD HEARD, *of Brighton, Sussex, for an Invention of a Portable Gas Lamp.*

THIS invention consists in condensing the inflammable vapour by forcing it into a strong vessel by means of a pump, which vessel forms the body or reservoir of the lamp; and when it is desired to light the lamp, the gas must be permitted to issue out by a gentle stream which is effected by the peculiar construction of the valve.

The body or reservoir may be made of any substance which is sufficiently strong to bear the pressure of the condensed gas, and of any form capable of affording the desired strength; a sphere is preferred, or a cylinder with spherical ends made sufficiently strong, which reservoir may be concealed within a figure.

The valve or stop cock is perforated in the usual way; but the key of the cock is contracted on one side by having two pieces soldered into it so as to leave an opening of a wedge form, for the passage of the condensed gas. The key is turned by means of an endless screw with a fine thread, working into small teeth upon the circumference of a ratchet wheel fixed to the axle of the key, by which means the key is made to turn very slowly. At first, when the gas is very considerably condensed, the key is gently turned, so that only the narrow end of the wedge formed aperture is brought up, admitting a very small current of gas, but as the gas consumes, its force diminishes, and a larger opening is required, which may be increased by turning the endless screw and bringing up the wide part of the wedge formed aperture.

Another contrivance proposed is a conical leather valve (similar to that in the reservoir of an air gun) which is to be placed in the opening of the reservoir of the lamp and pressed down when required by a finger screw. This lamp is proposed as portable and convenient for dwelling houses, for carriages, for ships, &c.

Inrolled, August, 1819.

To William Good, *of Bridport, Dorsetshire, for an Invention of an Improvement in the Art of Tanning Hides and Skins, and for Barking or Colouring Nets, Sails, and other articles, by the Application of certain Materials hitherto unused for that purpose.*

The improvement suggested by this inventor is intended to render the process of tanning less expensive, by appropriating the trunk, roots, limbs, branches, and leaves of the oak to that purpose, as he has discovered that the whole vegetable matter of the oak, whether at the growth of a matured tree, a pollard, or a sapling, possesses the tanning properties in a sufficient quantity to be employed with advantage in that business.

The method proposed for extracting the tanning properties is, first, by reducing the wood into saw-dust, or by breaking or grinding it into small pieces, so as to expose the fibre as much as possible.

Secondly, in immersing about one hundred weight of the wood in a boiler containing about sixty gallons of water, and allowing it to boil until the water is reduced to about forty gallons; then draw off the decoction so produced, and add to the wood in the boiler about forty gallons of water, which is to be boiled until the liquor is reduced to about twenty-five gallons.

For tanning calf or other thin skins, the produce of the second boiling is to be used as a weak ooze in the first process of tanning such skins after they come from the beam. Then to immerse the said skins in the liquor of the first boiling in the manner commonly adopted in the using of oak bark.

In the tanning of hides a decoction is to be made from one hundred weight of the limbs and branches of the oak bruised as above, three quarters of a hundred weight of fresh made oak saw-dust, and one quarter of a hundred weight of the roots broken; the whole must be boiled in about eighty gallons of water until it is reduced to fifty or sixty which is then to be drawn off.

To the materials remaining in the boiler, sixty gallons of water are to be added, which may boil till it is reduced to thirty-five.

The liquor last produced, is used in the first stage of tanning hides, and afterwards the decoction obtained from the former boiling.

The skins and hides having undergone the above operation, the respective liquors are to receive as much oak bark as will complete the process of tanning, the quantity of course varying according to the strength of each decoction, and which will depend upon the age and size of the trees.

In order to colour nets or sails, a decoction is made from one hundred weight of oak branches, and one hundred weight of spent bark (after it has been used in tanning,) in about a hundred gallons of water, reduced by boiling to about eighty gallons. The nets or sails are then to be immersed in this liquor (strained from the bark) and boiled in it for about three hours, after which they are to be allowed to cool in the boiler, and then to be taken out and dried as usual.

Inrolled, September, 1819.

To JOHN LEIBERECHT STEINHAUSER, *of Moffat Terrace, City Road, London, for an Improvement on Portable Lanterns and Lamps.*

THIS improvement consists in the adaptation of a shade to slide over the lantern, in order to darken it, for the purpose of a night or chamber-light. In the construction of the burner, no improvement is proposed, as that may be of any ordinary description, or a candle may be used in place of a lamp, and withdrawn at bottom. The shape of the lantern is proposed to be cylindrical, and the shade of the same, sliding up and down upon wires, which act as guards to the cylindrical glass. At the top of the sliding shade a pendant draws out, which opens the chimney of the lantern when it is suspended. When this pendant is shut down, and the shade also, the air is excluded, and the light extinguished, without any unpleasant effluvia arising, the lantern being thus closed, may (as the contrivance applies to small ones) be put into the pocket, the whole occupying little more space than an opera-glass.

Inrolled, March, 1820.

To JAMES JEFFRAY, *Professor of Anatomy in the University of Glasgow, for an Invention of certain Combinations of, and Improvements in Machinery to be moved by Wind and Steam, Animal Strength, Water, or other Power, by means of which Boats, Barges, Ships, or other Floating Vessels, may be propelled or moved in Water, and which Invention is further applicable to other useful purposes.*

THIS invention consists in a new form of pump, by means of which vessels are propelled forward, and which contrivance has such adjustments as to form and construction, as will give the vessel different degrees of velocity, and assist in steering and turning it in the water.

Two cylindrical open tubes or pipes are placed horizontally in the lowest part of the vessel under water, at or near the stern, and connected together by a bent tube or pipe of equal diameter.

In these two cylinders, pistons work alternately, by means of their connection with a steam engine or other first mover. By projecting a piston forward, the column of water occupying the cylinder is displaced, and the force of the piston against the water, has the effect of propelling the vessel in an opposite direction. Upon the return of this piston, the other is projected forward, striking against the water as above described.

Before we proceed further in the explanation of this invention, it is necessary to say, that the principle and process above described, without the slightest alteration of plan, is already the subject of a patent granted to the late Mr. Steadman Adams, of America, in 1810. The fatal defect of this invention is, that the returning stroke of the piston produces a re-action, which retards the progress of the vessel in an equal degree to the force by which it is impelled; and it is a well-known axiom in mechanics, that mutual action and re-action destroy each other.

The present patentee has further proposed and described, a method of working his pistons by a perpendicular stroke, and also to use two pair of cylinders, to be applied as above, one pair on each side of the keel, and when speed is required, he proposes to apply several pairs of cylinders placed along the sides of the vessel. Valves are proposed in various situations to regulate the progress, and direct the steerage of the vessel, but the whole plan being formed upon a false principle, must be found to fail when reduced to practice.

The other purposes to which it is proposed to apply this invention, are for pumping the vessel free from her bilge water in the event of her leaking, and also for exhausting the foul air from the ship, which will be replaced by a supply of pure air through the port-holes and hatches.

Inrolled, September, 1819.

To FRANCIS FOX, JUN. *of Derby, Doctor of Physic, for a method of facilitating and insuring the discharge of Fire Arms, and Artillery of every description.*

THE specification of this invention, describes a percussion gun-lock of an ordinary construction, in which a plug upon the cock is intended to strike into the touch-hole, charged with detonating power, by the explosion of which, fire is communicated to the gunpowder within the barrel. The touch-hole is in a small recess upon the upper side of a cylindrical piece screwed into the gun-barrel, in place of a pan, and in this cylindrical piece there is a channel from the touch-hole leading to the charge of gunpowder. A small quantity of detonating powder of the ordinary kind is put into the touch-hole as a priming, but as every description of gun-lock for discharging fire-arms by percussion is included in the patent of Mr. Forsyth of 1807, the above construction can form no part of the present invention.

A method of securing the detonating powder from damp, and preventing its falling out of the touch-hole, constitutes the whole invention for which the present patent is obtained.

For this purpose the patentee has invented a paper tube, which is made by bending a slip of thin writing paper, round a stick of the same size as the cylindrical piece, which is screwed into the barrel containing the touch-hole and priming. This paper tube is formed as above, by pasting the edges together, and when dry is washed over with a coat of varnish. After this, the paper tube is cut into small lengths as hoops, one of which is slipped on the cylindrical piece after every priming, for the purpose of covering the touch hole, and securing the powder from damp, and from falling out of the pan.

Inrolled, March, 1820.

Original Communications.

MESSRS. PERKINS *and* FAIRMAN'S *Plan for preventing the Forgery of Bank Notes.*

IT is well known, that forgeries upon the Bank have been, in most instances, committed by artists of the lowest kind, and at a small expense, and without the exercise of any considerable talent. The plan of Messrs. Perkins and Fairman calls forth the associated labours of many of our first artists, as well as means not to to be obtained without an immense expense, which (although the first cost of a Bank-Note plate would be great, and its imitation still greater) would yet enable the Bank to produce notes of this beautiful description, at an expense not exceeding that of their present indifferent ones.

A more complete account of the process will be presented to our readers in a future number of this Journal; but at present we are not authorized to explain every minutiæ of the specification of Messrs. Perkins and Fairman's patent, as it is not yet enrolled.

We are, however, favoured with specimens of the various kinds of work proposed to be introduced upon the Bank Note plate, and also with a copy of the memorial, signed by some of the most eminent scientific characters of the day, (particularly by a numerous company of gentlemen members of the Society of Arts,) which has been presented to the Governor and Company of the Bank of England.

Plate IV. contains the specimens to which we allude: they are engraved upon soft steel plates; and, after being hardened by the new process, are transferred to cylinders of soft steel, which cylinders are likewise hardened, and become the tools whereby any number of copper plates may be afterwards impressed.

The various subjects upon the specimen plate are repeated, for the purpose of shewing their identity: that is, that they are not copies of each other, but fac similes, taken by a reverse impress from the same original. The scroll works, are the production of a peculiarly constructed engine, by which engravings have been made, and their reverses taken as the other designs, in which, by combining both the engraved and the raised subject, an effect is produced similar to copper plate, surface, and letterpress printing united.

The head of His Majesty is an engraving by Holl, in the dotted or stipple manner. The emblematical vignettes, by Corbould, representing England, Scotland, and Ireland, surrounded by the arts and sciences, is executed in the line manner, by Heath; the small circular tablets of writing, in the upper part of the plate, contain the Lord's Prayer and the Creed; those in the lower part, the Ten Commandments; and the ovals, are occupied by the three first pages of the Bank Charter, engraved by B. Davies. These subjects are introduced for the purpose of shewing how far the process is capable of transferring every kind of engraving, and also of multiplying exact fac similes of the original *ad infinitum.* The scroll or engine work, is intended as an additional security to be printed upon the back of the note, by way of rendering any imitation, however humble, still more difficult; and thus, affording the public a paper circulation, of the validity of which they could entertain no doubt.

Opinions and Remarks upon the Means of preventing Forgeries.

The prevention of the forgery of Bank Notes, having become an object of great and continually increasing national importance; not only as being necessary to afford a just security to our daily business transactions, but as alike requisite to uphold the character and reputation of our laws and tribunals for the administration of justice; and above all, as being deeply connected with the cause and best interests of humanity; we, the undersigned, have been induced to examine, with considerable attention, the merits of the several plans which we have respectively seen and heard explained, as having been proposed for the attainment of that desirable object.

Among the plans so examined, we deem it proper to state, that the one proposed by Messrs. Perkins and Fairman, has our decided preference, for the following reasons.

At the request of those gentlemen, we have severally entered into a minute investigation of the principles upon which their plan is founded, as well as of the machinery and apparatus with which it is carried into effect. In order, therefore, to forward the great object in view, we conceive it may be useful to state the result of such investigation.

First. It appears then, that this plan affords the means of producing and multiplying exact *fac similes* of all the different kinds of engravings; as executed by machinery, with the engraving tool, and by the action of acids through the interstices of a ground; whereby the peculiar style of each original engraving may be accurately preserved and perpetuated *ad infinitum*.

Second. That any number of the most distinguished artists may be employed at the same time, to engrave all the different kinds of work upon separate plates, (previously prepared for the purpose,) and when completed, the whole of such engravings may be transferred and perpetuated as above, in a state of intimate combination upon one plate.

Supposing, for example, twenty-five artists to be employed at once, each to make an engraving that would require two months to complete, the combination of all these engravings upon one plate, would concentrate the labour of more than four years, which period could not be shortened by any combination of counterfeiters, in attempting to make an imitation, seeing that, in such an attempt, only one at a time could work upon the same plate, and seeing that the forger could not resort to the same method, on account of the vast expense, and other obvious reasons.

Third. That in addition to the bar thus opposed to the counterfeiter, by the concentration of so great a quantity of work, we are of opinion, that the combination of all the different styles of work as above stated, in the same note, would render it physically impossible, for any person to make an imitation that could be imposed upon the public as genuine, except it be by means of the like machinery and processes as are employed for making the originals. And that an important characteristic of this plan, consists in the facility with which the various engravings combined to form the figure of a note, can be transposed at will, so as entirely to change its general appearance, and by this means, the same original engravings may be used to form a great variety of notes, sufficiently distinct to produce the effect of entire novelty, and at the same time, a perpetual identity will be preserved in each individual engraving, the same as in types when transposed.

Fourth. That even though it were doubted by some, whether the quantity and combination of all the different styles of work upon the note, as above stated, could be relied upon as affording adequate security against forgeries, yet still we think, this plan affords the means of putting an entire and absolute stop to this evil: for it has been shewn that it would require four years continued labour to make an imitation, supposing it practicable at all; and to prevent the attempt, the Bank, upon issuing the notes might proclaim that they would all be called in, within that period, and another form substituted by a transposition of the engravings. This would, of course, render it absurd for the counterfeiter to expend so much time in imitating a note, which, when completed, would not resemble the new form to be put in circulation.

Fifth. That upon the ground of economy, this plan possesses very great and obvious advantages, inasmuch as it affords the means of combining upon the notes, the most highly elaborated and beautiful engravings of all the various kinds of work, the most difficult of imitation, to an extent sufficient, if need be, to cover their entire surfaces both front and back; and this, too, without any additional expense to the Bank ultimately, beyond what is at present actually incurred for engraving the simple form of the notes now in circulation. As in carrying this plan into effect, almost the whole of the expense consists in making the first plate; that is to say, the cost of the original engravings which are used as dies, and of the machinery and apparatus with which these engravings are transferred and perpetuated: when one plate is so made, the same dies, &c. will serve to make any number that may be required at a very trifling additional expence. Thus throwing the main expense upon the very first stage of the operation, and without incurring a very great portion of the first expense, the counterfeiter could not hope to make any sort of imitation.

Sixth. That the security afforded by this plan, does not at all depend upon any secret, for, if all the machinery and methods used for carrying it into effect, were shewn and explained to the counterfeiter, he would still have just the same expense to incur as above described, before he could make even the most distant imitation. And moreover, it is manifest, that neither the authors of the plan themselves, nor any other artists whatever, could make an accurate imitation of the work, without employing the same original dies and machinery; and these would of course be given up, to be kept in the Bank, if the plan should be adopted.

Seventh. That the perpetual identity of the separate engravings combined in the note, will enable any one to prove the genuineness of any note, by simply comparing it with any other note, or with slips printed from the same originals with which every one may be furnished; and thus by an absolute gauging of the work, a forgery might be at once detected. The advantages embraced in this part of the plan are too obvious to require elucidation.

And finally, considering this plan as embracing under the several heads already described, all the *desiderata* for rendering our paper circulation secure, and for putting an end to the crime of forgery, we have no hesitation in declaring our confident belief, that every competent judge, who will take the necessary steps to examine the subject, and to investigate the nature and merits of this plan, will concur with us in recommending it to our Banking Institutions for general adoption.*

Robert Smirke,
R. H. Solly,
Charles Sylvester,
John Barton,
George Rennie,
Bryan Donkin,
Mark Isambard Brunel,
Henry Maudsley,
Timothy Bramah,
Peter Kier,
George Dolland,
&c. &c. &c.

Such is the *Siderography*† proposed by Messrs. Perkins and Fairman. That such a plan, or one similar to it, will be ultimately adopted by the Bank of England as well as other banks, we scarcely entertain a doubt.

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* We have been favoured with a sight of an impression taken from an attempted imitation of a part of one of Messrs. Perkins' and Fairman's specimens of Bank-Note plates. Though this specimen is executed by an artist of the first talent, under the direction (as we are informed) of Sir William Congreve, one of the commissioners appointed to investigate the various plans proposed for the prevention of forgery, it affords the best possible proof of the impracticability of any tolerable imitation, as a person totally unacquainted with the arts, would, by comparison, immediately detect the forgery; and, with respect to small writing and engine work, this specimen must be pronounced a total failure.—Ed.

† From σιδηρος, *iron;* and γραφω, to *write.*

An Account of a Telescope of a new and singular Construction, invented by the Right Hon. the late Earl STANHOPE. *By Mr.* SAMUEL VARLEY.

(Concluded from page 51.)

IT may be asked if his lordship had recourse to so long a focus as 192 feet, what did he do more than others, as telescopes have been made and used of 600 feet in length: and it is said that a M. Auyoet made one of a thousand feet long: I answer, *much more.* As these aerial telescopes, as they are called, had their object glasses mounted upon a high mast or building sufficiently high above the eye, to enable the observer to see the object at its greatest elevation, and so situated, that he could move round it, to follow the motion of the sun or planet. This rendered it very difficult to observe with, or to find proper situations for that purpose. His lordship's object metal was not elevated more than the height of the eye above the horizon; and, he had no occasion to move from his place to follow the motion of his object, if it were not more than one half of the horizon. His telescope was also free from the tremors occasioned by the necessary height of the pole or building. Another advantage which he obtained, was, that with metals of not more than five feet focus, he could have a magnifying power of 800 times or more. And it will now be enquired, why he made them of so long a focus as 192 feet? I answer, to cure the tremors peculiarly affecting reflecting telescopes, more than refracting ones, noticed by the late Dr. Maskelyne and others.

His lordship made many experiments upon telescopes of every description, and constantly found, that, by reducing their apertures, those tremors were so much less, that he hoped, by carrying this reduction further, he could cure them entirely. And, as increasing their length is the same thing, he determined upon 192 feet for the focal length of his object metal, so that he might have such an aperture as would give sufficient light for the high magnifying powers, which he intended to employ.

The tremors of which I am now writing, are very different from those arising from an insufficient support of the telescope, and are occasioned by vapours ascending or descending through the air, as they are always greatest in hot weather, or after showers, or when a thaw follows a hard frost, as well as from other causes, perhaps not yet known. And, as they frequently prevent any good and satisfactory observations from being made with the very best telescopes, it would be of great consequence to have them entirely prevented from taking place. It is difficult to convince those who have had but little experience of the great injury occasioned by them in the use of telescopes, of which I could give many instances, but I shall confine myself to one only, that I may not be thought tedious.

Several years ago, I accompanied Lord Stanhope, to see Dr. Herschel's telescope; and we were indulged with the use of a ten feet one, of ten inches aperture, which was esteemed a most excellent one by the best judges. The evening being unfavourable, we were told that it would not perform well. His lordship thought the evening very fine, and could not see any reason why it should not perform very well; and was much disappointed in finding that he could not see either stars or planet so distinctly as he had been accustomed to see them with one of my own, which he thought much superior to this fine instrument of Herschel's. Mine was a three feot Gregorian, of six inches aperture, and not a good one of that size: I know that mine was very much inferior, but could not persuade his lordship that his disappointment was wholly owing to the bad state of the atmosphere.

But to return. His lordship, finding that those tremors were much increased when any telescope was put the least out of adjustment, he thought that, by strict attention to this circumstance, and making his aperture small, he could cure those tremors entirely, or, as he termed it, still the atmosphere. He observed, that the inflections of light, in passing through small eye holes, were very injurious, and, therefore, if he used eye holes at all, he made them large, and of the most unreflecting substances which could be obtained; such as black cloth, plush, velvet, coarse paper, burnt cork, &c., &c. In the Gregorian telescope, the error or aberration by figure, may be entirely corrected, and, therefore, there is no indistinctness on that account: yet these and all others, become more distinct when their apertures are contracted. This mystery has not been cleared up, nor the cause explained. His lordship, however, made many experiments for that purpose, and convinced himself that he had found the true cause, or rather, causes: for he believed there are more than one.

It is well known that the images formed by metals or glasses of a long focus, are larger than those formed by shorter ones. The parabola is a curve that is continually becoming more and more flat, as it recedes from the vertex, and, therefore, portions of a metal of that figure, taken at a greater distance from its centre, would form larger images than if taken at a less distance. This appeared to him fully to solve the seeming paradox; and a number of experiments that he made, confirmed him in that opinion, and further determined him to use metals of long foci and comparatively small diameters. Those experiments, leading to others, opened a new field of enquiry. Having made a hole of three quarters of an inch diameter through a pasteboard, he placed this before the open end of a Gregorian telescope, so as to intercept all light, but the small quantity admitted by that small hole, so placed, that he could move it nearer to the centre, or further from it at pleasure. His lordship was apprehensive that such a small aperture would not admit light enough to make the images visible; but, to his surprise, he found them much brighter than he had expected, and uncommonly distinct; so much so, that he found no difficulty in measuring and comparing images formed from different parts of the metal. He often repeated the experiment, and upon different telescopes, and constantly found those images formed by the other parts of the metal, bigger than those made from parts nearer to the centre. But what caused them to appear so much brighter than could have been anticipated, was another question, not easily answered. By repeating his experiments, however, with every possible variation, he was, at last, led to the true cause, which was the excluding, as much as possible, all foreign light.

It would make this article too long, and exhaust the patience of your readers, were I to relate all the means which he resorted to for this purpose, and, therefore, I will confine myself to those only which are necessary for understanding the extraordinary effect of his last experiment; and also mention a method, by which any person may easily make the experiment, sufficiently well to be convinced of the truth of what I have stated, without carrying it to the extent that his lordship did, or incurring much expense. This may be done by placing a few sheets of strong paper pasted together, and put before a window, so as to prevent, as much as possible, any light from entering, except what comes through a small hole made on purpose, about one inch in diameter, and made to range with the axis of the telescope, some object being placed on purpose about sixty yards from the window: a watch dial is, perhaps, the best for this experiment. If the telescope is placed a few yards from the window, and some few sheets of paper made black, with similar holes cut in them, and arranged in a line with the object and the telescope, the experiment will succeed better, and will convince any one that will be at the trouble of making the trial, how much mischief oblique or side light occasions.

If this experiment be made in the evening, when it is nearly dark, his lordship's last experiment may be repeated.* For this purpose, an achromatic or Newtonian telescope is most proper. Or, when the moon shines bright, direct a telescope to any star or planet near the moon, and it will evince the same thing. But not more in the use of telescopes than in nature's own instrument, the human eye, will this injury be perceived: for, let any person direct his attention to a fine picture, hanging against the pier, between the windows, at a time when the sun shines bright upon that side of the house, and he will find how little of its beauties can be perceived; but on viewing the same picture through a tube of one inch aperture, and a few inches in length, made black on the inside, in order to cut off the side light, he will then see it to much more advantage, as also on looking at a book or a piece of writing, the same will be observed, the ink will appear more black, and the paper whiter than without the tube. And, by forming a less perfect tube, of one or both hands, the same thing will be observed, though in a less degree. I have known good telescopes condemned by trying them upon objects situated towards the east in the morning, the south at mid-day, or the west in the evening.

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* See No. 1, page 34.

His lordship began his attempts to overcome this inconvenience, by blacking his tubes, or lining them with black cloth, &c.; but nothing succeeded so well as making his tubes so much larger than the diameter of his metals, as to admit of their being lined with a number of stops or diaphragms, made of thin pieces of wood, cut to a thin edge on the inside, much in the shape of a joiner's chisel, well blackened, and placed only a few inches asunder, the tubes, which contained the eye-glasses, were constructed in the same manner. This did much good, but not all that he wanted: for still a great deal of light found its way into the field of his eye-pieces, from surrounding objects, trees, bushes, grass-plats, gravel walks, and all neighbouring objects reflected some, but most of all white and bright clouds did the most mischief.

The light from all those things being reflected and inflected by the edges of the diaphragms, notwithstanding their being made as sharp as possible, and well blackened, yet some light was sent into the field, and prevented that complete darkness necessary for procuring the most distinct vision possible: for by interposing screens between these objects which he thought did the most harm, the distinctness was always increased in proportion to the number interposed. He then removed the telescope as far from the window as possible: but then found the walls and furniture did mischief, though not so much. In the last place, he made the room as dark as possible, and blocked up the window, through which he intended to view his object, with black boards, leaving a hole the size of his metal, ranging with the centre of the tube of his telescope and the object. In this state it was, when he made his last experiment, the result of which I have already mentioned.

It is easy to see that this arrangement could only serve for one fixed object, and was only meant for making some experiments, in order to establish certain points, relative to the final construction of his large telescope. First, to obtain high powers without being under the necessity of making use of lenses of short foci; secondly, to correct the error by figure, by interposing glasses between the object metal and its focus: those glasses he called correctors. It is easy to conceive, that the rays of light, reflected from a metal of a long focus, make a cone of a smaller angle than when they come from a shorter focus. He thought that this angle determined the size of the image, and that, by the interposition of lenses, he could make that angle greater or less at pleasure, and thus procure images as large from a short as from a long focus, and, at the same time, correct the error by figure.

Treating of the combinations of lenses, I have shown two methods by which this may be done; either by placing a concave within, or a convex without, or beyond the focus of the object metal, and, by those means, give any angle you please to the cone of rays, with this difference, that, in the former case, the image will be inverted, and, in the latter, erect. Upon making the experiment he found that he could give as great a magnifying power to a metal of 30 inches focus, as to one of 72 inches, with the same eye-piece; but, in the former case, he could not correct the error by figure so well as in the latter, and, therefore, gave up the idea of succeeding by using metals of short foci.

In this, as on all other occasions, his lordship carried his experiment to the greatest extent possible. By making the rays to pass extremely near to parallelelism, he obtained what he thought of great importance; namely, that there was no need of that nicety of adjustment requisite in other telescopes: for he could pull out or push in his eye-tube more than 12 inches, without producing any sensible indistinctness, and obtain very high powers with an eye-glass of 20 inches focus; but he found it more convenient to use lenses of about two inches, on account of the large size of the eye-tube, necessary in the former case. For the sake of simplicity, he used only two glasses: an eye-glass and a corrector. For the last he used all sorts of lenses, planos, both convex and concave, as well as meniscus: this last sort of lens he found (as others had done before,) inferior to either of the former.

In order to have the glass, of which his lenses were to be made, equally good, and of the same refractive power, he purchased a large plate, and had it cut into slips for that purpose; so that having once ascertained its refractive power, and carefully measured the radii of the tools in which it was to be ground, he could be sure of the foci of the various lenses which he intended to be made. He paid equal attention to the composition, casting and working of his metals. For this purpose he procured a sufficient quantity of purified copper and tin, and for casting them his method was different, and much superior to that in common use; instead of melting the metal in common melting pots, and then pouring it into moulds made of wet sand and loam, he melted his metal in a vessel or pot made of cast iron, *a*, Plate V. fig. 4. with a pipe of the same material *b* inserted into a hole in the bottom, and rising a little above it, as at *c*, its lower end being well fitted into the cover, or upper part of the mould, *d* which had a rebate *e e* to receive it; the mould with its cover, pipe and melting pot, being placed upon a large iron grate, upon which was built a fire-place, made of loose bricks not closely joined together, in order that a sufficient quantity of air might be admitted, and large enough to receive a proper quantity of charcoal for melting the metal. The hole in the bottom of the melting pot, was stopped up by a plug or stopper, *f*, made of wrought iron, the lower end being a little conical, and made to fit the hole of the pipe at *c*, and surmounted with the flanch *g*; this plug or stopper was made long enough to reach a few inches above a loose cover made to cover the top of the melting pot, which had a hole in the middle for this plug to pass easily through.

As it is desirable to know when there is a sufficient quantity of melted metal, the following method will determine that near enough. There is always some scoria at the bottom, as well as some floating upon the melted metal, neither of which must be suffered to enter the mould; the first is prevented by the pipe *b*, standing up a little above the bottom, as shown in the figure, the latter, by having more metal than will fill the mould; this may be known by first putting the plug into its place, and then putting in as much dry sand as will rise a little above the flanch, *g*, and then fill the mould with dry sand, which add to that already put into the melting pot, and notice the height which the two portions of sand occupies, and that will be a sufficient guide. Then pour out the sand, and put every thing in its place; put in a first quantity of metal, and put on the loose cover, after that nearly fill the fire-place with charcoal, upon that some charcoal already ignited, and then more charcoal to cover the whole. I ought to have said that the bottom of the fire-place should have some loose pieces of bricks put in it to fill it nearly to the bottom of the melting pot to prevent the upper part of the mould becoming too hot, which it would otherwise do. And for that reason the fire should be lighted at the upper part first which may be promoted by a pair of hand bellows, and the metal will soon be melted, and more added until there is enough. When that is obtained, and the metal melted, it may be let into the mould by raising the plug a little, but not so much as to raise it quite out of the pipe: this is done best by having a pin, *h*, in the plug, a little above the loose cover, in order to apply a rod of iron as a lever, by which the plug may be raised until the metal is seen to run into the mould, and when that is full, the fire should be removed as quick as possible by removing the bricks of which the fire-place was built, and the whole to be left until all is cold. By this method I cast many metals for his lordship, which proved better than any which I have ever seen cast by any other means.

The metal should be previously prepared and granulated in the following manner, and in the proportion of thirty-two parts of copper to fourteen of grain tin; the copper to be melted in a common melting pot in a wind furnace, and then the tin melted in an iron ladle, and poured into the melted copper; and, after stirring it with an iron rod, the whole should be quickly poured into a vessel of cold water by a gentle stream, and it will be found granulated and made convenient, for introducing, into the melting vessel. I could give sufficient reasons for the whole of this process, but it will be enough to state, the metal will always prove good when so managed.

The tin will mostly be found in too small a quantity in the above proportions; but as different sorts of copper require different proportions; of tin, the proper quantity can only be known by making a trial, which is most conveniently done in the second melting, by taking a small quantity out of the melting vessel with an iron ladle, having an upright handle: half an ounce will be quite sufficient; when cold, grind it upon a plate of metal, with a little fine emery, to discover whether it breaks up too much to bear grinding; afterwards break it, to judge of its strength and colour, which may be done in a few minutes: more tin may be added, if required, a little at a time, until it is brought to a proper state for working. By working, I mean grinding and polishing.

Nothing that I have yet mentioned deserves the name of difficult, compared to the last operation of grinding and polishing; particularly in the working of flat metals, such as the little metals for a Newtonian telescope. I have known one of the most experienced workmen bestow the labour of three weeks upon one of these, and, after all, he owned to me it was not flat; this metal was not more than two inches in its transverse diameter. How Lord Stanhope would have succeeded in one of six feet diameter I know not, as he did not live to make the trial. I may, perhaps, hereafter give the reason why this is found such an insurmountable difficulty. The working of spherical metals is much less so, and yet the difficulty is so great as to render it impossible to be perfectly accomplished, particularly in those of large diameters. The most perfect one I ever saw, was of ten inches diameter, and ten feet focus. His lordship's construction requires a flat metal of the same diameter as his object metal. If the difficulty of working a flat metal increases with its size, as it does in spherical ones, there would be no hope of success in working one of twelve inches diameter, which is the smallest size his lordship intended. But I think it does not so increase: for I wrought several of four inches, and some of seven inches in diameter, and did not find the difficulty much greater than in working one of an inch and half; nor does a very small degree of sphericity do any sensible injury, provided it be uniformly either convex or concave; but here lies a difficulty which has never yet been overcome.

His lordship, foreseeing the great difficulty in supporting and managing large tubes, and the impossibility of preventing the entrance of foreign light, determined to construct his large telescope without a tube, except a small one for an eye-tube, to contain his corrector and eye-glass, and such other glasses as he intended to make use of occasionally. With this view, after having well digested his plan, he had for some time been preparing a temporary one with such metals and glasses as he had ready, that he might make a sufficient trial of it to see if any alteration would be necessary, before he proceeded with the large one. After making many experiments with it, and finding it well answered his expectations, he determined upon forming the large one upon the same model, by erecting a stone pedestal upon a meridian line projected from the middle of a window where he intended to make his observations: this erection was to be the support of the object metal, fig. 5. which was thus to be detached from the other parts of the telescope. This metal was to have a strong stem at its back, for the purpose of fixing it to an iron tripod, having an adjusting screw to each foot, in order to give a small inclination to the metal, if necessary. The top of the pedestal having a flat stone slab for the three screws to rest upon, by which means it could be moved sufficiently to obtain a proper adjustment to the eye-tube. The whole to be secured from the weather or accident by being enclosed under a dome, or by a small building erected for that purpose, see fig. 3.

I now return to the window before mentioned, where the eye-tube was to be placed upon a platform erected for that purpose, consisting of one flat close grained stone, five or six feet long, and about two or three feet in breadth, which should be not less than two inches thick; upon this there was to be placed a bar of metal L, fig. 1 and 2, upon which the eye-tube was to slide for making a proper adjustment and obtaining distinct vision. There were also to be four protecting pieces N N N N. fig. 6. two at each end, through which four adjusting screws were to pass as feet for it to rest upon, as seen in figs. 1 and 2: thus either end of the bar could be raised or lowered a little, and the whole moved to the right or left as occasion required, while its own weight would be quite sufficient to keep it in its place after it had been once adjusted. Above this, and as near as possible to the eye-tube, without touching it, was to be placed an oval flat metal, whose conjugate diameter must be equal to the diameter of the object metal. This was to be supported, or hung, in an iron frame in such a manner as to be put to any angle required. A few diagrams with proper references, will make the whole easily understood: in each of them the same letter will belong to the same parts. It will not be expected that these diagrams are to any particular scale, as that would require the plates to be too large for this work, or the smaller parts too minute to be expressed.

Fig. 3. Is a view of the telescope and the metals. The eye tube is a double one; or two square tubes joined together; see fig. 6. where O is the tube that contains the glasses in use, and P a recess tube, into which one or more can be occasionally put out of the way when not in use. For

this purpose the tube has grooves cut at every place where a glass is intended to be stationed, into which square frames are to be fitted so as to be slipped into the eye-tube, or taken away as may be required. Into these frames the various glasses which he intended to use are fitted, so that, without loss of time or moving his eye from the eye-hole, he could alter the magnifying power at pleasure to eight, twelve, or twenty times, in which it became only a finder; or, by bringing forward another lense, having removed the former, he could have any power he wanted, without having any thing to screw or unscrew. His lordship found this a great convenience; it was on this account that he constructed the eye-tube as above described. The openings further from the eye, were for what he called his correctors, which were not spherical, but figured so as to correct both the error by colour and figure. But his lordship was not the first who made this attempt: for, before the discovery of the dispersion of light by Sir Isaac Newton, several of the greatest philosophers of that time, had tried to do the same by giving an artificial figure to their lenses, (somewhat like what is now done to metals with so much success) by flattening the curvature of their glasses towards the outside so as to cause all the light which passed through them to come to a focus at the same point of their axis; which, had they effected, the error by colour would have been but little altered, and not at all for the better. It was on this account that their scheme failed. To illustrate this, suppose a plano-convex lens, A V B, Plate III. fig. 2. and V its vertex, V C its axis, and A V or V B its semi-aperture; in this case the error by figure will be a little more than the thickness of the lens, V D or C F, nearly; on the other side of the axis, the red rays will fall on *r*, and the violet on *v*, the other coloured rays will be dispersed in their several orders from *r* to *v*, making the angle V B *r*, the angle of dispersion. If the scheme had succeeded, the angle A V E, would have vanished, and there would have been only the refracting angle A C V, but the angle of dispersions V B *r*, would still remain, as it originates from quite a different cause.

His lordship knew all this, but knowing also, that no dispersion takes place in reflected light, and that both these errors are nearly corrected by the Huygenian eye-piece, he conjectured that with a little management he should succeed, and produce an eye-piece more perfect than any that had yet been made. He made many experiments, but did not live to make all that he intended to have made. The other openings were to receive different eye-glasses, for the purposes mentioned above; their distance and situations were determined by planting them upon a plane board, which was easily done, as the frames were made square edged, and the eye-pieces being horizontal, they would stand in any place where he chose to put them ; and when he found the proper place, he carefully marked it as a guide where to make the openings to receive them in the real eye-piece. His tubes were put together with screws, so that he could take them to pieces, and cut other openings at pleasure if he saw occasion to introduce other glasses as circumstances might require.

To prevent light or dust getting into the tube he had a flap hinged to the outside of the tube, so that, by letting it down, he could get at any of the glasses, and when shut up the whole was made close and secured by a turn button or a hasp.

As this telescope was fixed to one position, and could not be moved to point to the object, there would be great difficulty to find any object that was to be viewed by it, so much so, that if some means were not found out for removing this difficulty the instrument would be nearly useless.

For this purpose the following contrivances were resolved upon. The flat metal A, fig. 1, front view, and fig. 2, side view, was fitted into an oval rim of brass, having the pins or axes *a a* for the metal to turn upon vertically, and hang in a frame B B, from which frame was an upright spindle E, at right angles to the axle. This spindle, intended to give the metal a horizontal adjustment, was suspended by its attachment to another frame C C, this frame suspended upon the pins D D, admitted of an inclination, as shewn by the dotted lines, fig. 2, for placing the apparatus parallel to the axis of the earth. Upon the vertical axis E, a plate of metal F was fixed and graduated into degrees in order to show azimuths and right ascensions. A similar plate G was also attached to the axis of A, having two sorts of graduations, the one to shew degrees of altitude, and the other degrees of declination, being so numbered that a half degree stands for a whole one as in sextants, the same is to be observed of the plate F.

Both of these plates were to be furnished with a vernior adapted to each set of divisions. When the telescope is intended to view terrestrial objects, the axis E must be placed vertical, and the altitude and azimuth determined by a small astronomical quadrant provided for that purpose; when this is done, the corresponding divisions upon the plates F and G, will shew the proper situation of the metal A to bring the object into the field of the telescope. The same method will answer for a star or planet when viewed at night, when they are visible to the naked eye, but if it be seen in the day, when they are not so visible, the axis E must be put into its inclined position as shewn by the dotted lines, fig. 2 ; in this case it becomes an equatorial instrument, by which a star or planet can be found, its right ascension and declination being determined by the common method. It is evident that it may be used as a transit or equal-altitude-instrument at pleasure, and thus answer many important purposes. To detail the whole and give every necessary direction would far exceed the limits of this communication. I may just observe, that the small astronomical quadrant should be firmly fixed and adjusted ready for use in an opening as near to the eye-piece as possible, so that the observer may turn his eye to it without moving from his place.

It was intended that the two projections or axles D D of the outer frame C C should work in two blocks of metal H H, made to slide upon the edges of two slabs of black marble K K, placed upon the platform, one on each side, and when adjusted should then be clamped fast in their place by screws II.

Fig. 1. is a front view of the platform, the bar of metal, M, for the eye-tube, and an end view of the tube itself is also shewn. The two divided plates can only be seen edgewise in this figure, while the frames are represented as they would appear to a person in the observatory, at a small distance from the telescope. The axis E should be made tapering, and kept up in its place by a screw and nut at top, a collet being under the nut, so that it could be made to move easily, but without shaking. The two axes of the metal should be made separate and screwed on the outside of the frame by means of flaps, through which there should be holes for the screws to pass somewhat elongated, that the pieces might admit of some adjustment to bring them to a right angle with the axis E ; the screws have broad collets under their heads: the outsides of the frame being made of a sufficient breadth for that purpose, and as flat and parallel to each other as possible, and at a right angle to the front and back of the frame. The centre of these pins or axes, and the metal A should be in one line, and placed in a horizontal plane, with the centre of the object metal, Z, fig. 3, which must have a small inclination, so as to bring the image below the plain metal to the eye-piece, which is placed as near to the metal as possible on the lower side: for if placed any where else, that and the parts which support it, would intercept much of the light that ought to fall upon the flat metal; but in this situation it intercepts none.

In using this telescope for terrestrial objects, the frame C should be put into its vertical situation, and the altitude and azimuth of the object taken by the quadrant; when this is done, the corresponding arches belonging to the telescope, being brought to the same number of divisions upon the plates, the object will appear in the field of the telescope. When used for celestial objects, the frame C must be brought into its inclined position, and the right ascension and declination taken from the tables published for that purpose; and, when the two arches belonging to this instrument are made to correspond, the object will then appear in the field as before, the whole instrument in all its parts, having been previously adjusted by such methods as are commonly employed in the adjustment of equatorial and other astronomical instruments.

This will be evident by fig. 3, where parallel rays from S, the Sun or a Star, are supposed to fall upon the flat metal A, (properly inclined) from which they will be reflected to the object metal Z, and from thence converging to a focus in the eye-tube O, where it will be visible, and magnified by the eye-glasses as in other telescopes.

If his lordship had lived to have finished his model, and to have made a trial with it, I am persuaded he would have found it necessary to have made some alteration in the arrangements of those parts which carry the flat metal and the eye-piece, particularly if he had observed any object situated due east or west. In what way he would have thought proper to make the alteration I do not know, although I see how it might have been done with advantage; but as I am describing his lordship's invention, and not my own, I shall make no further observations upon it at present.

Hitherto, I have described it as proper for viewing the southern half of the hemisphere. If his lordship had found it answer well for that, it was his intention to have built an observatory upon a hill near his seat, and to have erected a similar one for the northern half, so that he would have had only to turn himself from one to the other, to view the whole hemisphere.

His lordship intended to keep any of the heavenly bodies steadily in the field of his telescope, by means of a *heliostata*, an instrument invented (I believe) by Dr. Hooke, and described by Martin in his Institutes, and in his Gentleman and Lady's Philosophy. But I fear this instrument must be ranked amongst many other improbable, if not impossible schemes found in the writings of truly great and ingenious men. If it could succeed when applied to telescopes of low magnifying powers, I think it impossible it could, when used with such powers as those with which his lordship intended to charge his instrument. Lord Stanhope, however, saw no difficulty, and if he had lived, most likely would have made the attempt of constructing one for the purpose.

I have many times wondered, that any man, who had the abilities and ingenuity of the inventor of this machine, the *heliostata*, could ever hope that it would succeed, when it has its motion regulated by a pendulum, whether the escapement be of the recoiling, dead beat, or any other construction hitherto invented. Let any one observe the dancing motion of the second hand of an eight-day clock, and consider that the image would be twice as irregular in the field of the telescope, in a reflecting one much more, and I think he will be of my opinion, notwithstanding the flattering account given of its performance by Benjamin Martin.

In writing this description and giving it to the public through the medium of your scientific work, I have complied with his lordship's last and most earnest request made a few days before his death, when he observed, that as I was the only person who could do it, if I did not, the world would be deprived of the most valuable telescope that had ever yet been invented.

It might be thought presumption in me, to give my own opinion of the merits or demerits of this invention after the great attention bestowed upon it by his lordship, whose abilities are so well known, and, therefore, I shall only make a few necessary observations, one of which is, that the flat metal eye-pieces, &c. should be supported upon a strong piece of stone or brickwork, made independent and unconnected with the floor or walls of the place where it is to be used: for though the floor of the room where his lordship used his model was not laid upon joists as is common, but upon a stone floor, supported upon strong arches, with a good deal of brickwork between them and the floor, and the building every where a very strong one, yet, when I was attending him while making his experiments, I could not move, nor even lift my hand without occasioning tremors in the telescope.

I think the metals should be finished before the pedestal for supporting the object metal is erected, as it would be next to impossible to work metals of such dimensions to a very accurate length of focus, or to project a meridian line sufficiently correct, and therefore it would be prudent to place the object metal upon a strong moveable frame, until its proper position and place, were determined by experiment, and then a plumb line let fall from the face of the metal, would show where the pedestal should be built. I also think the place where it is to be used, should be made to project somewhat forward from the wall, in order to command a little more than one half of the horizon: but these are only my own conjectures, which may be adopted or rejected at pleasure.

His lordship thought proper to use a single lens for viewing his second and erect image, but I tried an Huygenian eye-piece for that purpose, both with an achromatic and Newtonian telescope of my own, and thought it better than his lordship's eye-piece. The whole length of mine, including the corrector, was not more than nine inches, and by which I could obtain high power with glasses of a much larger focus than otherwise would have been necessary.

SAMUEL VARLEY.

On a new Kind of Tracing Paper.

To the Editor of the Journal of Arts and Sciences.

SIR,

As I apprehend that one of the principal objects of your journal, is to disseminate as widely as possible, every information relative to the arts and manufactures, and to give publicity to every useful invention, I am induced to send you an account of a very curious kind of tracing paper, lately invented and used by the artists of Paris. There are few persons connected with the arts, and particularly with engraving, but must be aware of the importance of possessing a correct trace, and have experienced a difficulty in procuring paper sufficiently transparent for the purpose. Various experiments have been made with a view to render paper perfectly clear, and of a quality that will allow of the finest lines being drawn with a pen or pencil, but no attempt has yet been made to produce paper that will allow of the use of the point.

Where extreme accuracy is required, both the pen and the pencil are objected to, and the point is always preferred when it can be used. To those who are at all acquainted with engraving, any further observations will be unnecessary: and to those who are desirous to know the peculiar properties of this paper, and the various purposes to which it can be applied, I beg leave to refer them to the description of it given by the maker to the gentleman who presented it to me. As it is but little known in this country, and as it appears to possess some very valuable properties, and to be superior to any paper I have yet seen, I presume that the following account of it will not be unacceptable to your readers.

C. PYE.

(*Translation.*)

Instructions for using the Glass paper, invented and made by Mr. QUENEDY, engraver, *Rue Neuve des petits Champs, No. 15 a Paris.*

ON placing the paper over the design, you must take a sharp and fine point to trace every part of your design, and afterwards rub it gently over with black lead dust for engraving, and with black or red chalk for drawing. After having carefully wiped it with a linen rag, you turn it on the varnished plate and pass it by a single turn through the press, lightly covered with soft and dry linen. When it is for drawing it must be placed on white paper over a polished plate, and passed lightly through the press. Without a press you may obtain a trace by rubbing it over every part with a burnisher on a copper plate, a marble table, or any other thing equally hard and smooth. When you would have a trace the same as the original, you must trace on the worst side of the paper, and rub it with black lead or chalk, then turn it on white paper to see the trace, and make another on the other side. This second trace will produce one the same as the original.

You may also trace with black lead or any other black crayon, after having rubbed one side of the paper with fine stone powder sifted, and afterwards the black lead will easily mark on it. You will obtain a trace less clear by these means, but you may easily efface it, either by the rubber or with the stone powder, and thus make as many as you please. You may, if you prefer it, use Indian ink, but you must be careful to prevent any water from falling on the paper; a miniature may be traced and transferred on ivory. You may even with the same trace, produce several by printing it on dry paper. This paper also is very convenient for tracing on stone by rubbing it on the back with a burnisher, after having well fastened it at the corners of the stone.

On an improved Ball Cock.

To the Editor of the Journal of Arts and Sciences.

SIR,

THE objections arising from the use of the common ball-cock as usually applied to water pipes in order to shut off the stream when the cistern is nearly filled, induced me to consider of some simple contrivance by which the water should be enabled to run with the full force of the cock until the vessel is full, and then to stop instantly.

In the old method the ball is attached by an arm to the square of the cock, and as soon as the water rises so as to float the ball, the stream is partly shut off, by which the stream becomes so contracted, that more time is occupied in the water's rising the last ten or twelve inches than in filling the other part of the vessel, by which it frequently happens (particularly in broad shallow cisterns) that the stream entirely ceases before the vessel is nearly full; besides, the delay in filling caused by the bore of the cock being gradually closed is very objectionable, as in water that contains a considerable quantity of sediment, less time is allowed to settle for it before it may be required to be drawn off. To obviate this, I have contrived a small apparatus, as shewn by the inclosed sketch (see Fig. 2, Plate VI) which will be found convenient, as, by its use, the full force of water is enabled to run until the cistern is full, and then it will instantly turn itself off; *a*, is the cock of the ordinary kind attached to a water pipe; *b b b*, the lever and ball not fixed upon the square of the cock as in the old method, but moving upon a pivot fixed to the standard of wood which is attached to the side of the cistern; *c* a ratchet fixed upon the square of the cock; *aa* ball falling into the ratchet; *e e e* the line which passes round the wheel of the ratchet and over the pullies, *ff*. The weight *g*, must be sufficient to pull the wheel of the ratchet round when it is liberated, and so to shut the cock; *h*, is a stud or piece upon the lever, which, when the ball rises, presses against the arm *i*, upon the pall *d*, and raises it up so as to relieve the ratchet, and enable the weight *g* to turn the cock; *k*, is an arm or carriage connected to the ratchet, which prevents the lever *b*, from falling down beyond the angle at which the water would lift the ball.

I have had two of these ball-cocks in use for the last two years, and they answer perfectly well; besides which, they are so simple, that any common mechanic can make them, or alter those which are of the old construction.

I am, Sir, yours, &c.

J. TYER.

Homerton, Jan. 7th, 1820.

MR. MALAM'S *Gas, Water, and Steam Valve.*

To the Editor of the Journal of Arts and Sciences.

SIR,

DURING my engagements with the Gas Light Company, it has been extremely difficult to procure a valve perfectly tight, for the purpose of shutting off the gas in street mains, and when obtained, the necessary friction to which it was subject, in the act of opening and shutting, soon destroyed that accuracy of fitting, which was so essential to its effectual application. The slide valve and the cone valve, were, notwithstanding every endeavour to render them tight, both found inadequate; the hydraulic valve also was not without its objections, as the water in it was found under some situations to absorb the gas.

In consequence of these failures, I was induced to turn my attention to the construction of a valve, which should possess the quality of perfect tightness without the before mentioned objections. The result of which is, that I have constructed a valve upon a new plan, simple, cheap and efficacious, which is found fully to answer the object either for gas, water, or steam.

The drawing (Plate VI. fig. 1.) represents my apparatus placed in a square box, intercepting the main; *a a a*, is a screw spindle supported in a cup at bottom, working into a sliding wedge *b b*. Upon unscrewing the spindle *a*, the wedge will descend, while the spiral spring *c*, will keep the top plate *d d*, up to its bearing. Connected to the wedge is a square part, through which pass the pins *e e*, working in slits; *s s*, are the valves faced with cork or lead *g g*. As the wedge descends, the inclined planes are kept against it by the pins *e e*, working in the slits which cause the valves to collapse, and the two lateral faces are thus withdrawn (as far as the wedge will admit of) from passing against the sides of the box. The spindle being turned still to the left, is unscrewed, the spiral spring having extended to its utmost, will cause the whole of the valve and its appendages to descend into the lower part of the box, leaving the passage through the main uninterrupted, as seen by the dotted lines.

In the event of any temporary circumstance rendering it necessary to remove the valve, it can be taken out by unscrewing the bolts *h h*, and raising the cap *i i*; there is stuffing and male screw, on the top of the cap, in which the spindle *a* works; *k k* the lower part of the box is intended as a tar well, or to receive the condensed matter from the gas.

This stop-cock or valve I have before said, is calculated for water and steam, and, when once accurately made, is not subject to leakage by wear. When used as a steam valve, I should prefer making the facings of lead exclusively, but when used for a gas valve, or a water valve, either lead or cork, will be found perfectly to answer the purpose. It is obvious, from the nature of its construction, that its original cost will not be very great, and its little liability to get out of order, will render it very desirable for every situation (as in streets, mains, both of gas and water, brew-houses, &c. &c.) in which large cocks are required, and at present none are found sufficiently secure.

I am, Sir, yours, &c.
JOHN MALAM.

Romney Terrace, Westminster,
March 2, 1820.

Novel Inventions.

An ingenious and portable apparatus has been invented by John Beckway, husbandman, of Rushey Green, Lewisham, Kent, for the purpose of weighing and binding hay, which will be found of considerable advantage, particularly to the hay farmers supplying the London market, by enabling them to weigh, with precision, every truss before it is bound, and yet perform the business of binding with greater expedition than by the old mode, in which the buyer or seller was generally subject to loss from the necessary uncertainty of weight.

The various parts of the apparatus are contrived to pack together, and are removed from place to place as a wheel barrow, every piece of which is applicable to two purposes, either as constructing a part of the weighing-machine, or as assisting in packing and transporting the whole.

Fig. 1, Plate VII. represents the apparatus packed together upon a wheel barrow, with every implement necessary to be used in cutting, weighing and binding. Fig. 2. the same set up for weighing and binding, the respective letters referring to the same part in each figure.

The apparatus being unpacked, the wheel is taken out, and the bottom of the barrow *a*, turned upside down upon the ground as a platform, fig. 3. the standard *b*, is then set up in the sockets of the underside of the barrow. The frame *c*, is then unfolded, and the axis of the steelyard or scale beam *d*, placed upon the standard as a fulcrum, supporting the frame *c*, at the short end, and at the long end the counterpoising weight is suspended by a chain, and adjusted to the graduations upon the steelyard agreeably to the quantity of hay to be weighed. The bed of the frame *c*, is then fastened down to the platform by means of the lever, which held the wheel in the barrow.

Two hay-bands are then placed between the hooks *e e*, and extended along the bed of the frame *c*. The truss of hay is then laid upon the bed of the frame *c*, as shewn by dotted lines, and the lever or latch underneath withdrawn, so as to allow the scale beam to oscillate. The proper quantity or weight of hay being adjusted, the truss is bound round with the hay-bands, which were placed under it.

This truss being removed, the same process is followed in weighing and binding every other truss, which is done without the smallest delay or inconvenience; when the whole quantity required is bound up, the apparatus is dismounted and packed together in five minutes, as fig. 1.

The respective implements, such as the knife, fork, pin, and every part of the weighing machine fitting together upon the barrow so as to secure the whole, are bound round by the chain and weight and altogether tightly packed for conveyance.

The Society of Arts having received numerous testimonials of the convenience and utility of this apparatus from farmers who had used it during the last two years, presented the inventor with their silver Isis medal and fifteen guineas, a perfect model of the machine being deposited in the Society's Repository, for the inspection of the public.

Since Mr. Beckway's communication was transmitted to the Society of Arts, he informs us that he has made improvements upon this machine, with which it may now be had at the price of six guineas, by application to him, at Sangley Farm, Lewisham.

MR. LANE'S *Fruit Gatherer.*

AN invention by which fruit can be gathered either from wall trees or standards, without the risk of breaking the branches or bruising the fruit, was communicated to the Society of Arts last sessions, for which they presented to Mr. Lane, of Stockwell, the inventor, ten guineas, as a reward.

This apparatus, (shewn at fig. 4, Plate VII.) consists of a pole of white deal, or other light stiff wood, about ten or twelve feet long, or sufficiently so to reach to the extremities of the standard trees, where the best fruit is generally found growing. At the end of this pole is a pair of forceps, for the purpose of taking hold of the fruit; these are made to open and shut by means of a trigger at the lower end of the pole, which is connected to the moving forcep by a wire passing through the trigger up through a groove in the pole to the forcep. *a* is the pole of any desired length, *b* the fixed forcep attached to the pole, *c* the moving forcep. These are each made of a ring of metal covered and padded with soft leather, forming two cups to receive the sound fruit without pressing or bruising it. *d d* is the wire attached to the moving forcep, which passes along the groove in the pole down to the trigger. *e* the trigger formed so as to receive the right hand, the pole being raised by the left hand. The back of the right hand lifting the trigger to the dotted lines at *c*, slides the wire *d d*, and opens the forcep to the dotted lines at *c*. The fruit is then taken hold of by pressing the trigger, which closes the forceps and secures the fruit, by which it is brought safely to the ground.

A small basket or bag might be suspended to the end of the pole, under the forceps, for the purpose of receiving the fruit I, by which the trouble of lowering the pole to deposit the fruit singly as it is plucked, would be saved; but this is not described as being in the contemplation of the inventor.

New Hygrometer.

Mr. Daniell has invented a new hygrometer, which promises much utility. It may be had at Mr. Hawkes Grice's, instrument maker, New Bond-street. Further experiments appear, however, necessary to render it a perfect instrument.

Miscellaneous, Scientific Intelligence.

GREAT BRITAIN.

Society of Arts.

SINCE the publication of our last number, the 37th volume of the Transactions of this Society has been published, and it is most certainly not inferior in interest to any which has preceded it. A notice of several of the papers will be found in our present number. That of Mr. Beckway, describing a machine for weighing and binding hay, is deserving of particular attention.

The Society commenced their sitting for the present sessions in November, since which time they have been actively engaged in the investigation of new inventions and discoveries, principally mechanical, and have bestowed honorary and pecuniary rewards upon the following among other inventions of less importance:—Mr. Austin, for his method of setting and adjusting the bed stone of a mill.—Mr. Perrin, for a boat to remove mud from our shores, harbours and rivers.—Mr. Cherrey, for an improvement in the construction of carts and other carriages.—Mr. Smith, for an improved umbrella.—Mr. Black, for a new method of joining engine-hose.—Mr. Perkins, also for a new method of joining engine hose, and for a ship's pump. Mr. Hookey, for improvements in ship building.—Mr. White, for a double door spring—and Captain Stokes, for an apparatus to be substituted in place of a lost arm.

The premiums in Agriculture, Commerce, and the Fine Arts, are not yet determined.

Compressibility of Water.

During the current month, Professor Millington in a lecture on hydrostatics at the Royal Institution, took occasion to expatiate upon Mr. Perkins' experiments relative to the compressibility of water. Having filled a cylinder three feet long and four inches diameter with water, into which a rod or piston was passed through a stuffing box, and having a sliding ring upon the rod, the whole was lowered 500 fathoms into the sea, when it appeared by the situation of the sliding ring, that the column of water which pressed upon the piston, had sunk it, so as to have compressed the water one hundredth part of its bulk. The same apparatus was placed in a cannon filled with water, and secured air tight, when a pressure equal to 500 fathoms was forced in by means of the hydraulic press, and the same results as in the experiment in the ocean took place.

Allowing the full force to both these experiments, the first of which was, we understand, performed in a voyage from Philadelphia to England, we cannot by any means think that they are conclusive of the compressibility of water. In these experiments we are not informed at what temperature was the occean, or the air, nor of what temperature was the water used in the cylinder, nor of what kind was the water; and till these things are accurately determined, no results of their kind can be conclusive. We may observe, *en passant*, that we think it very probable *temperature* may be the cause of the extraordinary occurrences so often mentioned to have taken place in bottles with only air in them, when lowered to considerable depths in the sea; viz. that the cork was pressed into the bottle, and the bottle brought up full of water. Now nothing is more likely than that a diminution of the volume of air by decreased temperature, takes place in such experiments, a sort of vacuum in such case being formed within the bottle, and the external pressure, of course, pushes in the cork. *Sed tantum inquirimus.*

Tabasheer.

A substance called *Tabasheer* having some very peculiar properties, has latterly excited the attention of the scientific world. Dr. Brewster has published a paper in the Philosophical Transactions for 1819, Part II. giving an account of this singular substance.

Tabasheer is said to be inferior in refracting power to all solid and fluid substances hitherto examined. It readily imbibes all the volatile and fat oils, and indeed all other fluids. The essential oils are quickly absorbed, and, with the exception of oil of cassia, are as quickly evaporated, while the fat oils are slowly drawn in, and remain a long time in its pores; and in all these cases an opacity is produced by a partial absorption exactly as in the case of water. When the imbibed fluids have a colour of their own, or are tinged with colouring matter, the tabasheer exhibits a similar tint, so that it is easy to communicate to it any colour. The opaque tabasheer, which retains its opacity when its pores are filled with water, acquires a beautiful transparency from the absorption of the oil of the beech-nut; and it is curious to observe a substance like chalk, and consisting apparently of a number of particles in a state of accidental aggregation, converted into a transparent mass which the light freely penetrates in every direction.

If the tabasheer be wrapped in a piece of paper, and the paper be set on fire, the tabasheer becomes either black or brownish black, and the black colour increases in depth by the repetition of the experiment; if the blackened tabasheer be brought to a red heat, it is restored to its primitive whiteness, and resumes all its former properties.

It appears that tabasheer is of two kinds: the transparent and opaque. The specific gravity of the former when dry is about 2.412, and of the latter 2.059. The transparent tabasheer has the remarkable property of becoming opaque and white by absorbing a small quantity of water, and perfectly transparent when that quantity is increased. This effect taking place indiscriminately with all fluids, cannot be the result of chemical action, its cause must be, therefore, sought in the changes which the light suffers in traversing the vacuities of tabasheer. From a variety of experiments it is found, that in both kinds of tabasheer, the quantity of water imbibed exceeds in weight that of the tabasheer itself; of course this substance must be extremely porous, and hence arises its peculiar qualities for the transmission of light.

Peculiar Substance obtained from the Distillation of Coal Tar.

A brilliant white crystalline substance has been obtained in considerable quantities from the first and second distillation of coal tar; it gradually precipitates from the oil; every hundred gallons depositing about five pounds of it; the deposition is greatest in cold weather. When freed from empyreumatic oil it is inodorous and insipid; it is extremely volatile and fusible, at a temperature a little below that of boiling water. After fusion it concretes, with much expansion on cooling, into a soft fibrous crystalline mass of a specific gravity little exceeding that of water. It is highly inflammable, and, during combustion, throws off a very remarkable quantity of carbonaceous matter. It is insoluble in water. Alcohol of the specific gravity of ,820 readily dissolves it, and acquires an acid and aromatic flavour. Hot alcohol appears to dissolve it in any quantity ; and as the solution cools it is deposited in beautiful crystalline flakes. It dissolves in sulphuric acid by heat, and is also soluble in acetic acid, but nitric acid scarcely alters it ; muriatic acid also scarcely dissolves it ; in the caustic and carbonated alkalis it is scarcely soluble. But sulphuric ether dissolves it in large quantities, and in calorine it fuses spontaneously. It suffers no changes by repeated sublimations, at temperature above that of boiling water ; and its vapour may be passed through a red hot tube without decomposition ; if received into a cool glass globe, it crystallizes in white flakes as before. It seems to approach nearer to the properties of camphor than to any other known body.

BRANDE.

A New Atmometer.

The *Atmometer*, or *Evaporometer*, for measuring the quantity of water evaporated in any given time, has been lately brought to considerable perfection by ADAM ANDERSON, Esq. of Perth ; it is the simplest and most ingenious instrument of the kind hitherto known. It consists of a bent glass tube of sufficient width to admit of a liquid moving easily from one part to another, and swelling out into two bulbs, one oblong at the extremity of the bent neck of the tube, and the other circular at the top of the straight part of the tube. The straight part of the tube is affixed to a graduated scale. At the bottom of this straight part is introduced a quantity of alcohol, which, after being conveyed into the oblong bulb, is thrown into a state of ebullition, and while the stream is issuing from the bottom or end of the tube, it is hermetically sealed, so that the air is completely expelled from the whole tube and its bulbs. The circular bulb is then covered with moistened silk or paper, and the instrument freely exposed. In consequence of the pressure of the air being removed from the surface of the alcohol in the oblong bulb, a portion of that liquid passes into vapour and occupies the empty part of the tube. Were the whole instrument at the same temperature, this process would be quickly stopped by the pressure of the vapour itself on the surface of the alcohol; but as the circular bulb has its temperature reduced by the external evaporation from the moistened silk or paper, the vapour which rises from the oblong bulb is there condensed, and runs down in a liquid state to the bottom of the graduated tube. This distillation goes on more or less rapidly according to the degree of cold endured upon the circular bulb, that is, in proportion to the external evaporation, and consequently the quantity of liquid collected by the circular tube is a measure of the evaporation. When the atmosphere is completely saturated with moisture, or when the evaporation ceases, the temperature of the circular bulb will be the same as that of any other part of the tube, and the distillation, for the reason already stated, ceases. The measure of evaporation thus found, is expressed in inches and decimals of an inch, by means of the attached scale. In using the instrument the oblong tube is to be sheltered from rain by inclosing it in a case or cover to prevent its temperature being reduced below that of the atmosphere by subsequent evaporation; and the circular bulb must be kept constantly moist by means of a small cup containing water attached to the tube immediately below it, the silk or paper being in contact with water, or in the adjoining vessel as in the hygrometer. The instrument is placed in a vertical position, and is prepared for a new observation by inverting it, so that the alcohol may be conveyed back to the oblong bulb. This instrument possesses the utmost delicacy, and it is probable that it may in time supersede the use even of the hygrometer.

British Opium.

Many attempts have been made to obtain opium from the juice of the capsule of the single white poppy in Great Britain, but none which we have seen promises so much success as that lately made public in the Journal of Science, &c. by the Rev. Mr. Swaine. The opium obtained by this gentleman's process is reported to be excellent; and we may confidently hope that the healing art will soon cease to be indebted to Turkey for so important an article of the Materia Medica. Persons who collect the juice from the capsules of the poppy, are to be provided with a lancet blade of larger size than that commonly used in surgery for venæsection, adapted to a strongly twisted cotton string, and attached with leather to the lancet, so that it may be handled with ease when slung on the right wrist. Two goose quills of the larger size, cut in the form of scoops, are also necessary for the purpose of taking off the milky juice from the wounded capsule; and also a tin cup or receiver two inches and a half in diameter, and two inches deep, with a cover to close in the manner of a saucepan. In the centre of the cover a circular hole is cut out, an inch and a quarter in diameter, into which is soldered a tin tube made to fit the same, two inches and a half in length, standing one inch and three quarters above the cover, and entering the cup below three quarters of an inch. A piece of tin is cut out from the upper part of the tube, a little more than one third of its circumference, and three quarters of an inch deep. The edge of the higher part is then cut into several semi-circular scollops, of a size to fit the concavity of the scoop or quill: so that when the quill is drawn across the edge of the scollops to discharge its contents, it may be certain of falling on one of the scollops, and thus be scraped out clean. This apparatus is in other respects so contrived as to be tied round the waist, so as to be at once ready to receive the juice. Its cost may not probably exceed two shillings. As soon as the capsules of the most forward poppies are about one inch and a quarter in diameter the operator begins his work. With the lancet blade held between the finger and thumb of his right hand, he makes a slight incision horizontally about a quarter of an inch below the upper part of the bulb of the capsule, and about an inch in length, taking care just to penetrate through the cuticle *into* the *cellular tissue*, but not *through* it into the hollow part of the capsule which would prove of bad consequence; he then, as speedily as possible, makes a second incision in the same direction one fourth of an inch below the first, and a third at the same distance below the second. He then lets go the wounded capsule and proceeds to a second, a third, and so on, till he sees the milky fluid on the first nearly ready to drop; when he is to return to that and scrape the juice off which has exuded, observing always whilst doing this, to keep the point of the scoop upwards. He will then proceed to other capsules, not forgetting that while using the scoop, he must frequently draw it across the scolloped neck of his receiving vessel to remove the juice from it. When the day's work is ended the collected juice is to be put into a deep earthen ware plate, which must be placed in some dry out-house with a paper cover to guard it from dirt, &c. When a quantity is collected sufficient to make a loaf or cake, it must be either exposed to the sun's heat in the middle of the day when the weather is fine; or, which is the safer way, be removed to a stove, kitchen, or some other warm and dry room, where a constant fire is kept, and be well worked up together with the opium-knife turned daily, till it acquires plasticity sufficient to be moulded into the form required: after which the cake must be turned frequently till it be dry enough to be committed to the chest.

Steam Boats, and Steam Ships.

THE Savannah steam-ship arrived at Liverpool the 20th of June last, from America in twenty-one days. The steam engine was used during eighteen days of the passage. This vessel, although 350 tons burden, is only calculated for carrying passengers: the whole hold being requisite for containing coal sufficient for a twenty days passage. She has thirty-two state rooms, and the accommodation for ladies is very private. The steam apparatus occupies the greater part of the hold from the mainmast to the foremast, leaving only a small space on each side suitable for coal. The water wheels are affixed to a cast-iron axle-tree passing through the sides of the vessel above the *bends;* it is incapable of motion in any direction except that necessary for turning the water wheels; but the wheels themselves can be taken to pieces and removed in bad weather, except two principal arms of each, which being of cast metal, and securely fastened, and placed in a horizontal position in high seas, are productive of little inconvenience. The most powerful objection to steam ships in long voyages is the immense consumption of coals: ten tons per day. And it seems the engine is of little service except in moderate or calm weather. In a great breeze when favourable it is not wanted; and when unfavourable it cannot drive the ship against the wind.

The utility of *Steam Boats* in river and coast navigation appears, however, undoubted. By a recent account thirty-five of these are now in operation on the river Mississipi and its tributary streams, and their united tonnage is 7,259 tons. The largest is 443 tons burden; several are 400 and most of them are 200 tons or upwards; and thirty, whose united tonnage is 5,995 tons, are now building on the banks of the same river and its various waters.

Scotland seems to take the lead in the steam navigation of Great Britain. Twenty-five steam boats now navigate the Clyde, and to Ireland, Liverpool, &c. Their united tonnage is 1400 tons; the smallest is thirty-five tons burden, and the largest ninety. The Clyde steam boats are generally calculated to carry 120 passengers: but they do not average more than fifty passengers daily throughout the year. The Rob Roy, which goes to Belfast, is fitted to carry 200 passengers, and has carried 220. At the Frith of Forth are four steam boats, which upon an average during summer carry 500 passengers daily.

Steam vessels also ply on the Tay, the Humber, the

Trent, the Thames, the Dee, and the Mersey. The success of the Talbot between Holyhead and Howth, promises fair to render the intercourse between England and Ireland, as perfect as between two parts of the same island.

The Ayrshire Rose.

For some years past a very rampant and climbing rose has been cultivated in Scotland, under the name of the Ayrshire Rose. Such is the rapidity of the growth of its long tender shoots, that one plant has been known to cover a gable-wall twenty feet high, and a side-wall double that length in the course of two seasons. It has been, therefore, in much request for covering out-houses, and disguising offensive walls or paling. It is an exotic species, and nearly allied to the *rosa arvensis*, or white dog-rose. By minute inquiry, however, it appears that the Ayrshire rose is most probably a native of North America. It has been sometimes mistaken for the rosa arvensis, but it has several peculiarities which distinguish it from that species; one is, that it retains its leaves much longer than the dog-rose; in short, the Ayrshire rose inclines to be an evergreen in our climate; and in this respect is allied to the *sempervirens*, or ever-green rose. The Ayrshire rose has been thus distinguished: *Rosa capreolata—Ayrshire rose.* Surculis flagellatis procumbentibus, foliis ellipticis æqualiter serratis utrinque glaberrimis; fructibus ovatis (collo constricto) pedunculisque glandulosis. This rose was originally obtained from some imported seeds, in the year 1769. It is now propagated both by cutting and layers.

Magnetism, and the Variation of the Needle.

CAPTAIN Scoresby, in a paper in the Philosophical Transactions, for 1809, Part I. informs us that all the iron on board a ship has a tendency to become magnetical, the upper ends of the opposite being S. and the lower N. poles in the northern hemisphere and *vice versa.* That the combined influence of all the iron is concentrated into a focus, the principal S. pole of which being upward in the N. hemisphere is situated in general near the middle of the upper deck. That this focus of attraction, which appears to be a S. pole in a N. dip, attracts the N. point of the compass, and produces the deviation of the needle. That this deviation varies with the dip of the needle, the position of the compass, and the direction of the ship's head. It increases and diminishes with the dip, and vanishes at the magnetic equator. It is a maximum when the ship's course is W. or E., and it is proportional to the sines of the angles between the ship's head and the magnetic meridian. That a compass placed in either side of the ship's deck, directly opposite to the focus, gives a correct indication on an E. or W. course; but is subject to the greatest deviation when the ship's head is N. or S.

The Varying Hare.

THERE is a species of hare living in the Alpine districts of Scotland which seldom descends to the low countries, and never intermixes with the common hare. This hare becomes white in winter: the change begins to take place about the middle of September, when the grey feet begin to be white, and before the end of the month all the four feet are white, and the ears and muzzle are of a brighter colour. The body, except the back, which continues of a grey colour, becomes almost white by the end of October. By the middle of November the whole fur, with the exception of the tips of the ears, which remain black, is of a fine shining white. During this change no hair falls from the animal, so that the colour of the fur is actually changed. The fur retains its white colour till March, or even later, depending upon the temperature of the season; by the middle of May it is again grey. In the spring change the hair is completely shed.

Differential Thermometer, Photometer and Ethrioscope.

Dr. Howard has described a *Differential Thermometer* in the last number of the Quarterly Journal of Science, edited at the Royal Institution, which is an imitation of Mr. Leslie's, but on a different principle. In Mr. Leslie's the degree of heat is measured by the expansion of air; Dr. Howard's by the increase of the expansive force of the vapour of either or spirits of wine in *vacuo*. It is a test of great delicacy, and is easily constructed. A glass tube being first made with a bulb at each extremity, in one of which is left a small orifice, a portion of ether or spirit of wine is then introduced, and heat being applied, is brought to a state of active ebullition. At this moment the orifice is closed with a piece of wax, and finally, hermetrically sealed by the pipe. The tube may then be carefully bent in the form of a hook, and the scale and foot being adapted, the instrument is finished. This thermometer is more delicate than Mr. Leslie's. When a heated body, as the hand, is brought near to one of the balls the liquor sensibly ascends or descends; and as soon as the cause is removed it begins instantly to return to its former level. If the two balls were entirely freed from air the liquor would always remain at the same level in each branch of the tube, except a trifling difference caused by capillary attraction. This perfection cannot be obtained by the most skilful artist; there always remaining behind, notwithstanding all care to prevent it, a small residuum of air which is sufficient to make a difference in the height of the two columns. To obviate this, before the scale is adapted, the liquid is all to be brought into one ball, and the instrument is then reversed and left for a considerable time in that position, that both balls may acquire an equal temperature, and that the portion of air may be equally diffused through them. It is then to be restored to its proper position, and the point at which the liquid finally settles is to be marked as the commencement of the scale. The same operation is to be repeated whenever the instrument has been deranged by transportation or other cause. The best mode of constructing this thermometer, is to bend the tube previous to the introduction of the ether, a considerable portion of which should be boiled out of the tube in order to insure the expulsion of the atmospheric air; it is also convenient to tinge the ether of a red colour with the addition of tincture of cochineal.

Mr. Brande has constructed upon the same principle, a *Photometer* and an *Ethrioscope*, both of which, though liable to some objections, are most curiously sensible to the impression of light, and to the frigorific emanations of the heavens. Mr. Brande has also employed a modification of Dr. Howard's instrument as a photometric thermometer, which is found very useful in comparative experiments upon different plans.

New Method of Rectifying Spirit of Wine.

As water passes with facility through animal membranes whilst alcohol is almost perfectly retained by them, if alcohol of the specific gravity of ,861, be put into a bladder until it is half full, the orifice closed and the bladder be then exposed to the sun, the air or the heat of a stove, after a short time, the alcohol will be found rectified to ,817; and thus may all the water be evaporated. Upon the same principle, if a bottle of wine be closed by a piece of bladder instead of a cork, the wine will be found, after some time, diminished in quantity but strengthened in quality.

Poppy Seed and Poppy Oil.

NEITHER poppy seed nor poppy oil has obtained that attention in Great Britain which it unquestionably deserves. There is good reason for believing, that a considerable portion of the best olive, or eating oil sold in this country, is the oil obtained from the seeds of the single white poppy. It is well known that maw seed obtained from a variety of the poppy, has been long used in this country for feeding birds, and canaries will live upon white poppy seeds alone. Mr. JOHN YOUNG, in a paper inserted in the Edinburgh Philosophical Journal, informs us that one acre of poppies cultivated in the drill manner on spaces between rows of early potatoes four feet wide; two rows of poppies on each space, twelve inches between the rows of poppies, and eight inches between the poppy plants, so that there will be three feet between each double row of poppies occupied by one row of early potatoes, will produce in a good season 1000lbs. of seed, which will yield by expression 375 lbs. of oil. The seed of the poppy comes to maturity after the extraction of the opium as mentioned above. And when it is considered that it yields more than a third part of its weight of oil, and that a crop of early potatoes equal to 36 bolls per acre can be raised by the same culture, upon the same space of ground, with a crop of opium equal to 56lbs., there is scarcely any plan which can be devised equally profitable to the cultivator, or more beneficial to the community. After the opium harvest is over, the seeds will be ready for gathering about the end of August. The plants must be drawn entirely out of the ground, a sufficient number be bound together and placed against each other in the manner of corn sheaves, and the whole should remain in the field a few days until they are perfectly dry. The sheaves are then to be laid on a large cloth, the capsules bruised, and the seeds shaken out, and afterwards passed through a proper sieve. The oil should be extracted as soon after as possible, as the seeds then yield the largest quantity, and of the best quality. The mill bags and all the apparatus should be perfectly clean. The first oil which is cold drawn is the best; afterward a considerable quantity of inferior quality may be obtained by heating the cakes and pressing them a second time. This last is preferred by artists as a drying oil. The best oil must remain for five or six weeks before it is used, that it may deposit some impurities which are in it. It must then be poured into another vessel not perfectly closed at first, but the opening covered with a linen cloth or a bladder with holes in it, that certain exhalations may escape; nor should the oil be immediately used after the process is finished, as it continues to improve for a considerable time afterwards.

It is not commonly known, but we can assure our readers, that the seeds of the white poppy, when minutely masticated and eaten, afford as delicate an article of food as any nut whatever; and there can be no doubt of their nutritive and wholesome property.

White Oxide of Bismuth.

WHITE oxide of bismuth has lately been exhibited with good effect in some distressing pains of the stomach, attended with costiveness, eructation of wind, indifferent appetite, foul tongue, the pulse full slow and soft, with a wasting of the flesh. The pain was most troublesome and distressing between ten and eleven o'clock at night, when it came on with intolerable violence, and to such an extent, as to cause vomiting, when the matters thrown up were very liquid, great in quantity, and extremely acid. Various remedies were tried without any permanently good effect. The patient was about seventy years of age. Five grains of the white oxide of bismuth mixed with some tragacanth powder, were taken three times a day. Relief being obtained, the dose was increased to eight, then ten, and lastly to twelve grains, three times a day with such decidedly good effects, that the patient has been free from pain and uneasiness for some time. For three years past this patient has enjoyed considerable comfort by the use of this medicine: during this period the pain has at times returned, but has been uniformly removed by having recourse to this mineral. It should be added that the long continued use of this medicine has been productive of no bad consequences. Care should be taken to burn the white oxide of bismuth quite pure, as it is apt to be mixed with noxious ingredients in its native state before it is reduced to an oxide.

G. D. Yates, M. D.

A New Astronomical Society

Has been established in London. Their first sittings commenced at their house in Covent Garden, on the 10th of the current month. It was attended by a numerous assemblage of gentlemen of known ability. The Rev. Dr. Pearson read a paper upon a newly constructed microscope founded upon the principle of the double refraction of rock crystal; it promises to be of great advantage to the science. Many valuable books have been already presented to the society, the future progress of which we shall duly notice.

FRANCE.

Printed Maps.

THE celebrated MR. FIRMIN DIDOT is now employed in engraving the dies for moveable tyes for printing maps, which will, it is affirmed, equal those engraved on copper, and which invention seems to be exclusively his own. Many attempts have already been made to print maps with moveable types, among which the specimens from the presses of Messrs. Haas of Basil, and Periaux of Rouen, who exhibited in the exhibition of the Arts this year, a beautiful map of the department of the Lower Seine, are particularly distinguished, but they do not satisfy the expectation of connoisseurs. It is, therefore, to be hoped that Mr. F. Didot by his talent and zeal will succeed in conquering the difficulties which have hitherto opposed the complete success of this important branch of typography. Printing maps with moveable types is originally a German invention as early as the year 1478; but from its difficulty and tediousness, was afterwards abandoned. M. Didot will now, probably, find some method of facilitating the very troublesome process: *Nam inventis facile est addere.*

ITALY.

Pompeii and Herculaneum.

In prosecuting the excavations of Pompeii, a city which was buried by the ashes from an eruption of Vesuvius, in the seventy-ninth year of the Christian era, several edifices have been discovered in the street which leads to the temples of Isis and Hercules, and to the theatre. In a house supposed to have belonged to a man of science, some surgical instruments were found, of excellent workmanship; also some paintings representing fruit and animals, executed with great truth.

A late traveller, Mr. Williams, informs us, that the streets of this city are getting daily disencumbered. He entered by the Appian Way through a narrow street of small tombs beautifully executed, with the names of the deceased, plain and legible. At the gate was a centry box, in which the skeleton of a soldier was found with a lamp in his hand; after passing into several streets he entered a coffee house, marks of the cups being visible on the stone. The streets are lined with public buildings and private houses, most of which have their original painted decorations fresh and entire. The pavement of the streets is much worn by carriage wheels. A surgeon's house with chirurgical instruments; an ironmonger's shop where was an anvil and hammer; a sculptor's, and a baker's shop; an oilman's; a wine shop, with money in the till; a school, with a pulpit with steps up to it, in the middle of the apartment; a great theatre, a temple of justice, an amphitheatre 220 feet long; various temples; a barrack for soldiers, the columns of which are scribbled with their names and jests; wells, cisterns, seats, tricliniums, beautiful mosaic altars, inscriptions, and fragments of statues; pipes of terra cotta, to convey the water to the different streets, and stocks for prisoners, in one of which a skeleton was found, are among the many striking vestiges of the arts of ancient Italy. The houses are in general low, not more than ten feet high. The principal streets are about sixteen feet in width, with side pavements of about three feet; some of the subordinate streets are from six to ten feet wide, with side pavements in proportion; these are occasionally high and are reached by steps. The whole extent of the city, not one half of which is excavated, may be about four miles.

The unfolding of the Papyri discovered at HERCULANEUM, is extremely curious and interesting; but from the frailty of the material, the process is extremely slow; about half an inch is unfolded at a time, and fixed upon gold-beaters' leaf. The number of the rolls is very great. From their black and indurated appearance it requires an effort to believe them to be full of human knowledge. Two volumes only have yet been published; the last contains fragments of a work of Epicurus, and a Latin poem. In the next volume will be published a treatise of the philosopher Chrysippus, concerning Providence.

New Patents Sealed, in 1820.

To Francis Fox, Jun. of Derby, Doctor of Physic, for a Method of facilitating and insuring the discharge of Fire Arms and Artillery of every description.—Sealed 15th of January.—Two months for Inrolment.

To John Moody, of Margate, Kent, Gent. for an Inkstand, containing carbonaceous and extractive matter in a dry state, which with the addition of water only will supply Ink.—Sealed 25th of January.—Two months for Inrolment.

To George Shoobridge, of Houndsditch, London, Woollen Draper, and William Shoobridge, of Mardon, Kent, Farmer, for a substitute for Flax, or Hemp, and for manufacturing the same for all purposes for which Flax or Hemp are used.—Sealed 5th of February.—Six months for Inrolment.

To James Haggett, of Hailsham, Sussex, Smith, for a machine to he attached to carriages as a substitute for a drag to regulate the speed, and to prevent accidents in going down hill or in other perilous situations. Sealed 10th of February.—Six months for Inrolment.

To William Collins, of George Street, Grosvenor Square, Middlesex, Lamp Maker, for some useful additions to, and improvements on Carriage and other Lamps. —Sealed 10th of March.—Two months for Inrolment.

To William Pritchard, of Castle-street, Southwark, and Robert Franks, of Red Cross-street, Cripplegate, Hat

Manufacturers, for an improved method of manufacturing Water-proof Hats, to be made of Wool, Silk, Beaver or other Fur, the brims of which are perfectly waterproof, and will in all weathers, and in every climate preserve their original shape, being stiffened without the use of glue, or any other material which would prevent the effect of the water-proof mixture.—Sealed 18th of March.—Two months for Inrolment.

To Frederick Migbells Van Heythusen, of Sidmouth Street, St. Pancras, Middlesex, Esq. for a method of making portable machinery or instruments to be placed upon a desk or table, and so contrived as to fold or not into a small compass made of wood, brass, or other metal, to support a silken shade for the purpose of protecting the eyes from a strong light; added to which is a green, blue, or other coloured glass in a frame, and in such a position that when placed opposite a window, lamp, or candle, it will take off the glare of white paper, by shedding a green or blue or any other tinge, dependent upon the colour of the glass reflector upon a book or paper placed within the bounds of its shadow, so that print, however small, or writing, is rendered more plain or legible by reason of the glare being thus taken off the white paper by day, and particularly by candle light: by this means the eyes of the reader or writer will be relieved from injuriously dwelling upon a white surface.—Sealed 18th of March.—Two months for Inrolment.

To Abram Henry Chambers, of New Bond Street, London, Esq. for an Improvement in preparing or manufacturing substances for the formation of highways and other roads, and which substances when so manufactured are applicable to other useful purposes.—Sealed 18th of March.—Six months for Inrolment.

W. Shackell, Printer, 11, Johnson's-court, Fleet-street, London.

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Recent Patents.

To JACOB PERKINS, *late of Philadelphia, in the United States of America, but now of Austin Friars, in the City of London, Mechanist, for certain Machinery and Implements applicable to the transferring of engraved or other Work from the surface of one piece of Metal to another piece of Metal; and to the forming of Metallic Dies and Matrices. And also Improvements in the Construction and Method of using Plates and Presses for Bank Notes and other Papers, whereby the producing and combining various species of Work is effected upon the same Plates and Surfaces, the difficulty of imitation increased, and the process of printing facilitated. And also in an improved Method of making and using Dies and Presses for Coining Money, Stamping Medals, and other useful purposes. And also for certain Machinery, applicable to Ornamental turning and Engraving.*

THESE inventions consist of five parts, viz. first, certain combinations of mechanical powers for the purpose of constructing presses whereby engravings upon plates or blocks of hardened steel may be transferred to rollers, blocks, or plates of soft steel; second, improvements in the construction of printing presses, and facilities in the modes of using them as applicable particularly to the production of Bank notes; third, apparatus for the purposes of coining money and stamping medals, &c.; fourth, certain methods of softening steel for the purpose of engraving upon and afterwards of hardening the same to produce dies or punches; fifth, improved lathes for turning and engraving geometrical figures and ornamental scroll work.

The claims of the present Patentee are for improvements upon a former Patent obtained by Mr. J. C. Dyer, in 1810, (this gentleman being the agent of Mr. Perkins,) in which, under the title of "*certain improvements in the construction and method of using Plates and Presses, and for combining various species of work in the same Plate for the kind of printing, usually called copper plate printing, designed for the object of detecting counterfeits, for multiplying impressions, and saving labour,*" are described plates or blocks of steel rendered fit to receive engravings of various kinds, particularly for Bank notes, checks, and lottery tickets; and also of a method of hardening the said plates or blocks after they have been so engraved, whereby the work upon the plate is rendered durable; and also of taking reverses of the same plates upon soft steel, which are therein denominated *Perkins's Stereographic Steel Plates.* And likewise presses constructed expressly for the purpose of printing from these plates. The nature of these improvements and their detail will be fully understood by the plates referring hereto, and the following description communicated by the Patentee himself.

Plate VIII. Fig. 1, represents the horizontal vibrating lever press, viewed in front. Fig. 2, a top view, with all the parts in the situation, as in use; B, B, &c. the four upright sides of the frame of the Press, tenoned into the base or sill C, and strengthened by the cross beams D, D; upon the top of the sides B, B, is the press bed E, E, which is secured to the sides by screws and nuts, and has two grooves or slits F, F, in it, for the two upright bars G, G, and H, H, to pass through and move freely therein backwards and forwards. The bar H, H, turns upon the pin or bolt I, as a fulcrum, which is supported in blocks, fixed to the sides of the frame B, B; the bar H, H, passing through one of the grooves F, in the press bed E, E, is connected, by means of the joint, with one end of the vibrating lever K; the other end of which, is conneoted, with the upper end of the upright bar G, G, by the joint L; the bar G, G, is connected with the lower horizontal lever M, by the bolt N; this lever M, moves upon the bolt O, as a fulcrum, which rests in one of the sides of the frame B; to the other end of the lever M, is connected by the joint P, the rod Q, Q, having firmly fixed in the middle of its upper end, a short rounded plate of iron R, upon which the lever T, presses, one end of which lever, lodges under one of the pins or staves U, U, which are fixed in the side of the frame B, and the side piece V, attached to it; and upon the other end of it, the weight W, hangs, and can be slided along it, as required in use. The upper side of the lever T, has a semi-ciroular notch or gap in it, at its end, which lodges under one of the pins or staves U, U, and on the under side of it, near that end, are made several other similar notches, any one of which, can be placed upon the rounded edge of the plate R, of the rod Q, as may be required to increase or lessen the

pressure. The press bed E, E, is supported near its centre, upon the top of the strengthening frame X,X,X; and has two ribs Y, Y, cast upon it, on which rests the adjustable bed Z, the under side of which, is formed of a portion of a cylinder; and in the centre of it, is screwed the arm *a*, to which is jointed the socket or tube *b*, having a female screw within it, in which acts the male screw *c*, the cylindrical stem of which, acts in a hole made in the plate, *d*, which has two pivots moving in the ears, *e*, *e*, which are screwed into the underside of the press bed, and thus allows sufficient play to those parts in use. The adjustable bed Z, can be moved sideways, backwards, and forwards, by turning the winch *f*, of the screw *c*. Upon the adjustable bed Z, is supported the bed *g*, by means of the four screws, *h*, *h*, *h*, *h*, which are screwed into the bed *g*, and their heads project into four shallow circular holes, made in the top of the adjustable bed Z, to receive them, two of which are shewn at *i*, *i*. Upon the upper face of the bed, *g*, is to be placed the copper or steel plate to receive the impression from the circular die or roller *j*, which is suspended from the under side of the middle of the vibrating lever K, in the manner now to be described. The die or roller *j*, consists of a hollow steel cylinder, fitted upon a steel axis, which is formed into two cylindrical necks on each side of the roller, as shewn at *k*, *k*. On the underside of the vibrating lever K, is secured by screws, a brass bearing box *l*, in which are two semi-circular gaps or notches, which receive the necks *k*, *k*, of the roller's axis; the roller *j*, is kept up, and prevented from falling out of these gaps, by means of the wire stirrups *m*, which has two hooks at its lower ends, which take hold of those parts of the neck, *k*, *k*, that extend beyond the bearing box *l*; and the stirrup itself hangs upon a wedge *n*, which is placed between it, and the top of the vibrating lever K. Each end of the axis of the die or roller is made square, on which squares fit the square gaps made in the ends of the die lever, and by means of which, the die or roller can be turned backwards and forwards, upon the surface of the steel or copper plate *w*, lying upon the bed *g*, as aforesaid.

When the weight W, and the lever T, are removed, the rod Q, may be lifted up by means of its handle *p*; in order, however, to facilitate this, and retain the rod at any required height, a counterbalancing weight *q*, is suspended by the line *r*, which passes over the pulley *s*, and is connected with the longer end of the horizontal lever M, by the loop *t*. In order to lessen the friction of the upright bars G,G and H,H, in the grooves F,F, made in the press bed E,E, these grooves are covered with two brass plates *u*,*u*, having a corresponding groove in each, but which are made rather narrower than those grooves in the bed over which they are placed. These brass plates *u*, *u*, are firmly secured upon the bed, by the screws *v*, *v*, &c. The length of this press ought to be at least, fifteen feet, in order to allow the vibrating lever to move sufficiently near to a straight line to answer its intended purpose; the difference, however, between its motion and a straight line, is compensated for, partly by the materials, viz. wood, of which its frame consists, but chiefly by the accommodating motion of the levers, and it therefore becomes necessary in using it, to place it so as to pass through the floor of the work-room in which it is situated, to the room below, and even to raise the floor of the work-room by means of a platform, for the operator to stand upon, and as shewn in the plate.

Plate VIII. Fig. 3, shews an improved steel or copper plate, or block printing press. The principal improvements, consist in a new method of heating the

plate or block; in the use of a tympan, for the purpose of saving the expense of making the plates or blocks any larger than is necessary to receive the engraving: as well as to save ink, and also time and labour in changing the plates or blocks. The manner in which these objects are effected will appear from an inspection of the plates, and the following description thereof. A, A, &c. is the cast iron frame of the press; B, the upper cast iron roller, on the axis of which is fixed the wheel C, with handles around it, for the workman to pull by; D, the lower cast iron roller; E, F, the bed of the press, made partly of cast iron, and partly of wood; the part E, is of cast iron, the better to resist the pressure of the rollers, and to convey the heat employed to warm the plate or block, as described hereafter: the plate or block G, is fixed upon the bed, by means of screws, passing through countersunk holes made in the bed, from the underside of it, and into screwed holes, made partly through the plate or block itself. The tympan, H, is a wooden frame, covered with copper, and turning upon the hinges, I, I, and having an aperture in it large enough to inclose the plate or block, the sides of which aperture are made feather-edged, so as to overlap the bevelled edges of the plate or block, and prevent them from soiling the paper. The cast iron part of the bed of the press, with the plate or block upon it, is heated by means of a block of cast iron J, which is supported upon the plate K, with turned-up edges, and which block is removed and replaced by another, from time to time as it cools. In use, the frame of the press is inclined, the front end, resting upon the floor, and the other end being raised by two screws, passing through screwed holes in the sill of the press frame, one of which screws is shewn at L: the intention of this inclination is, to cause the bed to return after the impression is made, of its own accord; and in order to admit of this, a portion of the roller B, is removed; and three pairs of additional rollers M, M, M, are added, for the bed to roll upon with more facility; each pair of rollers being fixed upon a separate axis, with necks, working in brasses. The blankets N, N, are secured to the cast iron bed, at one end, by the blanket-holder O; and a stretcher P, is affixed to the other end of them; from which cords Q, Q, pass over the pullies R, R, and have weights, (one of which is shewn at S,) hung to them; by this means, the blankets are kept stretched, and relieved from the roller, and prevented from matting or becoming dirty in use. The roller B, is kept up when the bed is released by the following contrivance: T, T, are two wooden blocks, lying at the bottom of the chases, in the press frame; into each of these blocks is fitted a screwed nut, into which are screwed two screws, having flat cylindrical heads, W, W, with notches or teeth cut around them, and which project beyond the sides of the press frame, so as to be easily turned either way, as required. Upon these heads, the brasses X, X, are rests, in which the necks of the axis of the roller B, turn; and the roller can thereby be supported at the required height, as above mentioned.

At Plate VIII. Fig. 4, is represented a cylindrical steel, or copper-plate printing-press. A. A. &c. is the cast iron frame of the press. B, the main cylinder for holding the plates; which has a solid cast iron cylindrical surface or rim, upon which the plates are firmly secured, by means of screws passing through holes, made in the surface of the cylinder, from the inside of it; and entering into screwed holes, made partly through the plates. The main cylinder is mounted on an axis, with necks on each end of it, turning in brasses, fixed upon the tops of the two main upright standards of the press frame. C, is the small cast iron pressing cylinder, having necks upon its axis, turning in sliding brasses, which can be adjusted, so as to press with more or less force against the main cylinder B, by the screws; one of which is shewn at D. E, E, is the endless web, or blanket, passing over, and carried forwards, by the pressing cylinder C, and over the web cylinder F; the necks of the axis of which cylinder turn in brasses, fitted into sliding carriages, with adjusting screws; one of which is shewn at G, for stretching the web. Upon the extended axis of the pressing cylinder C, is fixed the drum, or rigger H, which is driven by a band I, I, receiving its motion from the moving power. The plates J, J, &c. are inked by the roller K, coming into contact with them in succession, as the main cylinder revolves; and which roller is inked from the distributing rollers L, and M, the latter of which receives the ink, in the usual manner of machine typographic printing presses, from a trough and ductor; and which, therefore, need not be here shewn. The ink is more uniformly distributed over the plates by a hand roller, used by a workman. Another ductor N, is supported by brackets at each end of it, to the main standards of the frame, (one of which is shewn at O,) in the usual manner of calico printing, and therefore need not be shewn here: this last mentioned ductor N, scrapes or takes off the larger portion of the ink, lying upon the surfaces of the plates; the remainder being removed by several persons wiping it off in succession; and finally, cleaning their surfaces, much in the same way, as in copper-plate printing. The paper properly moistened, may be either laid upon the revolving web or blanket E, E, in sheets, and be taken away when printed; or may be in the form of one or more long sheets, which must be previously wound upon the reel P; (the necks on the axes of which turn in semicircular gaps or notches, made in the tops of standards affixed upon the frame of the machine, one of which is shewn at Q,) and passes beneath the directing roller R, until it reaches the press; after passing through which, and becoming printed, it finally passes over the roller S, to be taken away. The courses of the endless web or blanket E, E, &c. and of the long sheets of paper, are indicated by the arrows, which are shewn accompanying them in their progress. The standards which support the necks of the rollers K, L, M, and R, are omitted in the drawing, but must of course be employed in use.

In Plate VIII. Fig. 5, 6, 7 and 8, are represented parts of a circular coining press; in which Fig. 5, is an end view; Fig. 6, a side view; Fig. 8, a section of Fig. 5; and Fig. 7, a plan of the bed, lower die, and cutter. A, a cast-iron cylinder, containing the upper coining die, and male cutter. B, a cast-iron bed, containing the lower coining die, and female cutter. C, the adjusting bed. D, D, the adjusting wedges of the lower die. E, the lever, which turns upon a pin or stud at one end of it, and by moving upwards, raises the wedges D, D, and lower die, resting upon them. F, the upper coining die and male cutter. G, the lower coining die. H, the female cutter. I, the upper elastic circular wedge. J, the lower elastic circular wedge. K, the screw for adjusting the upper die, and cutter. L, L, screws for securing the upper elastic circular wedge. M, the adjusting screw for the lower die, and which is fixed to the lower of the two wedges, D, D. N, the female screw, or nut of the screw M. O, the line affixed to the lever E, which is passed over a pulley, (not shewn in the drawing,) and has a weight at the other end, (likewise not shewn,) which acts so as to raise the lower die G, and throw out the piece coined, after having received the impression. P, the adjustable bed *z*, of the vibrating lever press, described in Fig. 1 and 2. The cast-iron cylinder A, is applied on the under side of the vibrating lever K, of that press, by means of its cylindrical necks Q, Q, working in the gaps of the brass bearing box *l*, in the same manner as the die or roller *j*, there described; and it may be turned or rolled backwards and forwards, in the same manner, either by a double spanner, with circular holes in its ends, to fit upon the ends or the cylindrical necks Q Q; and which are prevented from slipping round thereon, by means of iron or steel webs or fins, fitted into grooves R, R, and made in the necks, and projecting above their surfaces; fitting into corresponding gaps, made in the holes in the ends of the spanner to receive them; or it may have a vibrating motion given to it, from any proper first moving power, by means of a lever, connecting rod, and crank; or other means, which need not be described here. A groove or channel S, is made around the cast iron cylinder A, to admit the slips of metal, out of which, the pieces are to be cut and coined, (and which had previously been reduced to a proper width and thickness,) to pass freely; and it has a perforation through the centre of it, and at right angles to its axes, made of a proper shape, to receive the various parts enclosed within it, as before described; as well as two others, for the screws L, L, to act in. The cylinder revolves upon the bed B; its surfaces A, A, being always in contact therewith. The bed B, has a conical perforation T, T, made partly through it, shewn in section at Fig. 8, to receive the conical elastic wedge J, and steel cylindrical ring or female cutter H; and a cylindrical hole U, at the bottom of the conical perforation T, T, to permit the lower die G, to move freely up and down in it. The lower face of the upper coining die F, has the head, &c. of the coin indented in it; and the upper face of the lower coining die G, has the reverse indented in it; and the slip of metal is first cut into a circular blank by the male cutter, or edge of the upper coining die, as it revolves, passing into the female cutter H, and acting partly as circular shears, and partly as the beds and punches of cutting presses, at the same time that the dies give the impression on each side of the blank; and when the cylinder has passed the lever E, by means of the weight affixed to it, as before described, raises the lower die G, with the coin upon it, a little above the top of the female cutter H, and it is carried forwards, in the hole in the slip of metal, out of which it was pressed or cut, and thrown off in its passage. The strip of metal is prevented from clinging to the upper die F, by two small hooks, under which the slip is passed, and which hooks are affixed on the bed B, though not there shewn. The upper wedge D, has necks or pivots at one end of it, V, V, which lodge or rest in gaps or notches made in two brasses, W, W, which are screwed upon the adjusting bed C; and which allow that wedge to play up and down, but prevent it from moving endways. X, is part of the arm *a*, described in the references to the drawing above.

(*To be concluded in our next.*)

To JAMES HADDEN, *the younger, of Aberdeen, Scotland, for an Invention of an Improvement, in Preparing, Roving, and Spinning of Wool.*

THIS improvement consists in preparing wool, that is, in drawing wool after it has been carded or combed; and also roving and spinning wool in a *heated state.*

The patentee observes, that various methods may be adopted for supplying heat to wool during all, or either of the three processes of preparing, roving and spinning, (all of which he claims the exclusive use of as new in these kingdoms: the method which he has adopted is the introduction of cast-iron heaters into the retaining rollers used for the said processes, observing that he always uses three rollers or cylinders together, and by leading the wool over half the circumference of the upper two rollers, charged within with the heaters above mentioned, he thoroughly warms the wool without retarding the progress of the other presses.

The mode of applying the heaters, is by making the retaining cylinders hollow, and by introducing a cylindrical heater into each retaining cylinder; these heaters are made exactly to fit the interior of the retaining cylinders; the axes of which pass through a channel for that purpose in the middle of the heater; it is to be observed that the heaters may be put within the driving or carrying cylinders with equal effect, and that the patentee considers the *heating of wool* during the above processes, as extremely advantageous, and a novel introduction into that manufactory.

Inrolled, May, 1819.

To JOHN LEWIS, WILLIAM LEWIS, *and* WILLIAM DAVIES, *of Brinscomb, Gloucestershire, for certain Improvements in the Application of Pointed Wires or other pointed substances of a suitable nature, for the purpose of Raising the Pile or Face of Woollen Cloth or Fabric requiring such process.*

MESSRS. LEWIS and Co. are patentees of several successful inventions applicable to various parts of the manufactory of woollen cloths, viz. for the substitution of cards, (a sort of wire brush so called) in place of teasels, a vegetable production hitherto used for the purpose of raising the pile of the cloth;—for machinery applied to shearing superfluous wool, and rendering the face of the cloth a smooth surface, and for apparatus applied to polish the surface in the last process of dressing: the present patent is for an improvement in the mode of applying pointed wire to the purpose of raising the pile in the operation of dressing.

The cloth is wound upon the roller *a*, shewn in section by diagram, Plate IX. Fig. 6, and drawn off into the roller *b*, between which it is distended over the bar *c*; this bar has a groove upon its upper side for the purpose of allowing the cloth to spring when the cards strike upon it; *d* is the bar carrying the cards for raising of the pile, which bar is moved by an excentric motion applied to its axes; *e*, is a roller covered with cards or points, for the purpose of drawing the cloth over the bar *c*; *f*, is another roller covered with cards, the points of which enter the cloth and turn the roller *b*; this roller *f*, is supported at its ends by two arms swinging upon the axis of *e*, by which it is enabled to rise or fall, accommodating itself to the bulk of the cloth wound upon the roller *b*.

These rollers are turned by means of pulley wheels and bands or cog-wheels, regulated to their respective required velocities, and put in motion by any first mover connected thereto.

As the rollers, by a very slow revolution, draw the cloth forward over the bar *c*, the card bar *d*, is put into a rapid excentric motion, by which its fine points strike into the cloth, and draw out the pile with more effect than by any other process, and without the possibility of that injury to the cloth which might arise from drawing the wire cards over its surface.

The various parts and detail of the machinery are not altogether new in their combinations or effects, excepting so far as respects their application to the above purpose, and may be variously constructed and disposed so as to give the required motion to the essential parts above described.

Inrolled, August, 1819.

To John Lewis, William Lewis *and* William Davies, *of Brinscombe, Gloucestershire, for certain Improvements in the Application of Mechanical Powers, for the Purpose of Laying, Smoothing and Polishing the Pile or Face of Woollen or other Cloth or Fabric, and also for cleansing at the same time the same Cloth or Fabric, requiring such operation.*

The construction of the apparatus for smoothing and polishing cloth is in many respects similar to that described in the last patent, and represented in Plate IX. fig. 6, excepting that in place of the grooved bar *c*, and card bar *d*, the bar *c*, is in the present patent made solid as a resisting surface, and the bar *d*, carries a burnisher as shown at fig 7, above.

The cloth as described in the preceding is wound upon the roller *a*, and stretched over the bar *c*, to the roller *b*, which draws it forward. The polisher attached to the under side of the bar *d*, is made of horn, bone, wood or other suitable hard substance, which, as the bar *d*, moves by an excentric motion, strikes upon the face of the cloth, and rubs over its surface by which the pile is laid, smoothened and polished. In this process the upper surface of the bar *c*, being solid, should be covered with several thicknesses of cloth or other elastic substance, as a bed (over which the fabric operated upon is distended) for the purpose of preventing the polisher as it falls from cutting the cloth.

During this operation the patentee proposes to pass a current of water over the cloth for the purpose of cleansing it, which may have a small quantity of soap, or Fuller's earth mixed with it when such shall be found necessary.

Inrolled, August, 1819.

To ISRAEL GUNDRY, EDWARD NEAVE, *and* JOSIAH NEAVE, *of Gillingham, in the County of Dorset, for their Invention of an Application of various Gases or Vapours to certain Useful Purposes.*

IT is well known that in many chemical and manufacturing processes, such as the distillation of coal, the production of inflammable gas from oil, and in the burning of limestone, a large quantity of gas mixed more or less with vapours of various kinds, is generated or liberated by the action of heat on the substances employed. These gases are in some instances as in the burning of limestone, allowed to escape into the common air without any use being made of them. The object of the patentees is to apply the gases so generated or liberated, to the purpose of working a piston or pistons in a vessel or vessels either pure or mixed with vapours of various kinds; and by which a mechanical first mover or power is obtained, capable of driving wheels or other machinery; or to the purpose of forcing water to any other liquid by means of such gases pressing thereon by their elastic power.

It is essential to the purposes of this invention that the gases to be used should be produced or disengaged in close vessels, either by the action of heat or otherwise. From these close vessels, whether retorts, hollow cylinders, or by whatever name they may be called, the gas may be conveyed by a pipe or pipes, or other suitable means, into a barrel or barrels fitted with a piston or pistons. Into this barrel the gas may be introduced, so that its elastic force, either alone or by subsequent condensation, may propel the piston in the barrel, and thus produce a mechanical first mover, or power, capable of driving wheels or other machinery. Or the gas may be conveyed into a hollow vertical cylinder, or other vessel, where it may accumulate till its elastic power shall have found a required portion of water or other liquid in such cylinder or vessel, through a pipe or other channels to the higher level where such water or liquid is intended to be discharged.

After the gas has produced its desired effect, it may be either suffered to escape entirely, or it may be received in a gasometer, and used again for any purpose required.

The gases which may be most profitably employed, and indeed chiefly used for these purposes by the patentees, are the inflammable gases obtained from coal or oil: after these gases have effected the purposes of the patentees, they are still perfectly applicable to the purposes of illumination.

The Patentees do not lay any claim to any part or parts of the apparatus itself which is here detailed, but to such combination or combinations of machinery or apparatus as are necessary to work a piston, or piston in a barrel or barrels, by means of factitious gases either pure or mixed with vapours of various kinds; or such combinations of machinery or apparatus as are necessary to bring into operation such gases, as mechanical agents for the purpose of forcing water or any other liquid.

The apparatus of the Patentees, of which the following is a description, is designed chiefly for the production and use of COAL-GAS. In the use of oil or any other fluid, or tallow, or other article capable of being rendered fluid as the material for producing the gas, it may be a necessary caution to state that the regular supply of such fluid or article capable of being rendered fluid, may be introduced into the retorts by means of forcing pumps, or some other contrivance, whereby the pressure of the gas within the retorts may be counteracted and overcome.

Figure 1.—A longitudinal section of the gas distillatory apparatus.

Figure 2.—A front view of the gas distillatory apparatus, and a transverse section of the gas-engine and condenser.

Figure 3.—A bird's-eye view of the gas distillatory apparatus, and of the gas-engine and condenser.

Figure 4.—A transverse section of the gas-fountain.

Figure 5.—A longitudinal section of the safety apparatus.

The same letters of reference indicate the same parts in each of the figures.

a.—The brick-work, or masonry, containing the oven, furnace, &c. with fire-place, and the ash-pit below, its door being furnished with a register.

b.—An archway for receiving the coke, as it is withdrawn from the retorts.

c.—A breast of stone, or of masonry, for the purpose of securing the middle retort from the too violent action of the fire.

e.—The oven, containing the retorts, having iron pillars or stands, on which the retorts are supported. Each of these pillars divides into two prongs, where it reaches the bottom of its retort; and these grasp one half of its circumference.

f.—The arch or crown of the oven.

g.—The flue leading to the chimnies. These rise from each end of the flue, and unite at the top of an arch which they form.

h.—An air-chamber between the crown of the oven and the arch supporting the upper part of the brick-work or masonry.

iiiii.—The retorts.

jjjjj.—The ascending retort-pipes with metallic valves at top, to prevent the return of any gas towards the retorts, within the cubical boxes, connecting the ascending and horizontal retort-pipes. These boxes are furnished with screw plugs, opposite to the insertion of each of the pipes, for the purpose of occasionally examining or cleaning them; to the upper screw-plugs are fastened the pipes which serve to guide steadily the rods of the metallic valves 16.

k.—The horizontal retort-pipes with joints, connecting the horizontal and descending retort-pipes.

l.—The descending retort-pipes. Each of these is furnished at the upper end with a screw-plug, for the purpose of occasionally examining or cleaning it.

m.—The induction-pipe, lying across the flue.

n.—The ascending safety-pipes, connected at one extremity with the induction-pipe, *m*, and at the other extremity, with the cubical boxes, *o*, Fig. 5, which connect the ascending and horizontal safety-pipes. These boxes contain the safety valves fitted accurately to the openings from the ascending safety-pipes *n*. The rods of these valves work through stuffing-boxes; which boxes are attached to the upper surface of the cubical boxes *o*. On the top of each rod is to be a lever or steel-yard, furnished with a moveable weight, for the purpose of regulating the pressure on the valve.

p.—The horizontal safety-pipes, passing from the cubical boxes to the conducting pipe with which they are connected by joints at the conducting-pipe *q*, for the purpose of conducting immediately into a condenser or tar vessel, or other suitable receiver, such gas as is not employed in working the engine, or in working the forcing apparatus.

r.—Spare-pipes, connected with openings in the ascending retort-pipes *j*, by means of joints; and also with openings in the conducting-pipe *q*.

s.—The transfer-pipe, connected with an opening in the induction-pipe *m*; and also with an opening in the conducting-pipe *q*, by joints; these pipes are furnished with stop-cocks, to be opened or closed, as occasion may require, and also with cocks, called by patentee liberating cocks, to be opened as occasion may require, when it may be desirable to let off any gas that may be contained in the pipes with which they are respectively connected.

tt.—Mouth-pieces and stoppers of the retorts. Each mouth-piece has two flanches; to one of these flanches the retort is attached, by means of screw-bolts and nuts; and against the other the stopper is pressed by a screw forcing against its centre. The latter flanch has a ring, projecting above its surface, which fits into a groove turned in the stopper to correspond; and these, as well as the plain surfaces, are turned and ground to fit accurately. By introducing between the stopper and its mouth-piece, a damped sheet of stout brown paper we have been enabled effectually to prevent the escape of gas.

v.—The barrel or cylinder in which the piston works. This barrel may be enclosed in a jacket or case; and, the interstice between the barrel and its jacket or case may be filled with any heated fluid, or other convenient material which transmits heat slowly, in order, as much as may be convenient, to keep up the temperature of the barrel and its contents.

u, and *w*.—The two branches of the induction-pipe: the upper branch *u*, opens into the top of the barrel, and the lower branch *w*, opens into the bottom of the barrel.

x, and *y*.—The two branches of the eduction-pipe: the upper branch *x*, opens out at the top of the barrel, and the lower branch *y*, opens out of the bottom of the barrel. The eduction-pipe terminates in the condenser, or tar-vessel. In these pipes are cocks, valves or regulators, to be alternately opened and closed, by means of a plug-beam, connected with and worked by the engine, or they may be opened and closed by any other means, so as to effect the alternate entrance of gas into the barrel, when its entrance is required, and the exit of the gas out of the barrel, when its exit is required; at the bottom of the cylinder or barrel *v*, is a pipe, furnished with a cock, for the purpose of drawing off any fluid, or condensed matter from the barrel, in case any such fluid, or condensed matter, may, at any time, have subsided in it.

z.—The condenser or tar-vessel. This vessel is designed to receive the tar, or any other substance which may be deposited in it, and also to cool the gas itself. For this purpose it may be placed in a cistern, or it may, in some other convenient mode, be exposed to the action of cold water, or any other expeditious method of cooling it may be used, having a cock by which the tar and other substances deposited in the condenser may, from time to time, be discharged.

z.*—A pipe to convey the gas out of the condenser into the purifier or other receiver.

aa.—Fig. 4, The forcing vessel.

bb.—The forcing-pipe with a valve at bottom, opening upwards, to prevent the expelled water, or other liquid from returning to the forcing vessel.

cc.—A pipe, furnished with a cock, whereby the forcing vessel may be emptied of any liquid it may contain; in this figure are shewn the stop-cocks in the eduction-pipe; and in the eduction-pipe there is a stop-cock placed in the short pipe, which connects the forcing vessel with the induction-pipe, and with the eduction-pipe.

dd.—A float, which may be used to prevent the free contact of the gas and the liquid contained in the forcing-vessel.

ee.—A valve, opening inwards, which may be used to admit a fresh quantity of liquid to flow into the forcing-vessel, from some supply without.

ff.—A cistern, in which the forcing vessel may be placed; and, which may contain water or any other liquid; there is also a cock, whereby the cistern may be emptied.

gg.—A reservoir, which may be used to receive the liquid that may be discharged from the forcing pipe, *bb.*

The figures 1, 2, 3 and 5, represent the gas distillatory apparatus, the engine, and the condenser. In or on the engine the gas is employed as a mechanical first-mover or power for the purpose of driving wheels or other machinery: The Patentees call the whole apparatus a GAS-ENGINE.

Fig. 4, and its description represent the forcing apparatus. In or on the forcing apparatus the gas is employed as a mechanical agent for the purpose of forcing water, or any other liquid, which the Patentees call a GAS-FOUNTAIN.

Inrolled, August, 1819.

To BARON CHARLES PHILIP DE THIERRY, *late of St. George's, Hanover Square, London, but now of Bath-hampton, in the County of Somerset, and of the City of Bristol, for a Bitt for Coach and Bridle use, which said Bitt is called the Humane Safety Bitt.*

THIS is an improved bitt or curb for the mouth of a horse, which is made with an additional bar in the mouth, sliding upon the cheeks or side pieces of the ordinary bitt, and which is brought into action by a pull of the curb rein. This sliding bar or mouth piece is intended, when not in action, to lie close to the fixed bar, or common curb or mouth piece, already in use, and is brought into action by being slid down the side pieces so as to bear against the horse's tongue, and force open the mouth. This contrivance is effected simply by connecting two separate reins to the sliding bar, or additional curb; the upper one of which, the riding rein, passes also from the common curb, and is used as a snaffle, or bridoon for ordinary purposes. The rein is connected to the sliding curb by small chains, which pass down through rings at the bottom of the side pieces, and is intended as a bearing rein or gag rein.

When the snaffle or riding rein is held, the additional curb is drawn up out of action; but when this is loose, and the bearing rein is pulled, the sliding curb is drawn down, by which a great extent of the horse's mouth is occupied with the two curbs, and by means of the power obtained at the bottom ends of the cheeks or side pieces: the curb rein acting upon the additional curb, has a great power in restraining the horse.

There are two stops upon the cheeks or side pieces, to prevent the additional sliding curb from passing so low as to enable the horse to lift his tongue over it.

Inrolled, January, 1820.

To John Sinclair, *of Edinburgh, for a certain Improvement in the Manufacture of Shawls, Plaids, Scarfs, Handkerchiefs, Gown Pieces, and other Articles, into which Coloured Threads are wrought into Flowers and other Fancy Figures in the Process of Weaving.*

The Patentee states that the modes of weaving hitherto adopted in the manufacture of the above articles, having threads of different colours for the working of flowers and other fancy figures (called imitation of Indian manufacture) has been with a tweel or diagonal thread upon the surface, which tweel has the effect of breaking, distorting and injuring the pattern.

The improvement herein proposed, is the construction of a different texture, by means of which the varied forms, points, and veins of the pattern, are obtained with the minutest accuracy.

The essential particular of this new texture, consists in setting aside or appropriating a certain portion of the warp threads (which are to be called binding threads) for the purpose of coming between the spotting threads of the surface, and the ground weft threads. Which portion of the warp being thus employed, keeps these ground weft threads out of the surface, where they could not appear without considerable injury to the appearance of the pattern.

The specification sets forth no particular description of weaving machines, but simply the mode of drawing, carding, and working the loom to obtain this improved disposition of the threads.

Inrolled, January, 1820.

To JAMES WOOD, *of New Compton Street, St. Giles's in the Fields, for an Invention of an Improvement in the Formation and Position of the Long Keys, B natural, and C sharp, used upon the Musical Instrument called the Clarionet, for the more easily fingering of the same.*

THIS invention consists in placing the keys, and altering the parts of the said keys in such manner as to allow the finger of the performer, to pass from the key C sharp to B natural, and from B natural to C sharp, either in the case of ascending or descending with greater facility than can be obtained by the form and arrangement of the said keys in the present construction of the clarionet.

In touching the keys upon the old clarionet, to produce the notes above mentioned, the performer is under the necessity of passing the fingers across or round the instrument, a motion extremely inconvenient and difficult to effect, particularly in quick passages of the music. To obviate this, the said keys are so formed and placed upon the present improved clarionet, that the fingers of the performer are only to be slid or extended up and down the instrument, by which that part of the fingering is rendered more simple and easy of acquirement.

Inrolled, January, 1820.

To JAMES THOM, *of Wells Street, and* WILLIAM ALLEN, *of Castle Street, both in St. Mary-le-bone, for an Invention of a certain Improvement in Piano Fortes.*

THE object of this improvement, is to preserve a more uniform tension of the strings, by rendering them less affected by the changes of temperature, which cause an expansion or contraction of the wood-work to which the ends of the strings have hitherto been attached.

The improved method proposed is by removing the strain of the wires or strings from the wood-frame, and distending them upon metallic rods, bars, tubes, or plates, so situated and united together, as to form a metal frame to receive the pins, or other modes of attachment, round which the ends of the wires or strings are fastened, by which it is presumed that the tension of the strings will be much less altered by the atmospheric changes of hot and cold, damp and dry, than in piano fortes of the usual construction, where the ends of the strings are immediately connected to the wood-work. As there are a variety of modes by which the above invention may be adapted to piano fortes, and perhaps with equal advantage, the patentees consider every mode or adaptation of the same, as coming within the meaning and privilege of their patent right.

Inrolled, April, 1820.

To PHILLIPS LONDON, *of Cannon Street, in the City of London, for a method of Destroying or Decomposing the Offensive Vapour arising from Animal and Vegetable Matter.*

THE objects of this patent seem particularly directed to the removal of such offensive effluvia as arise from the melting of tallow and the boiling of soap, though equally applicable to a great variety of cases in which the boiling of animal and vegetable substances emits a very noxious and prejudicial vapour. The specification of this patent describes a boiler set in a peculiar manner, having a breast-wall, or rim of brickwork rising some distance above the top of the boiler, by which all effluvium which may happen to escape, owing to the cover not being perfectly tight, is enclosed by an upper cover fitting upon the rim of brickwork so as to prevent its escape. In order to get rid of the vapour thus accumulated in this upper receptacle, the access of atmospheric air is shut off from the fire under the boiler, by closing the doors of both fire-place and ash-pit; and opening other doors which lead to the receptacle of foul vapour above described, by which the only supply of air to the fire under the boiler, must be passed through channels which run from the said foul vapour chamber and pass down behind the boiler to the ash pit, by this means all the noxious effluvia which arise from the matter contained in the boiler, are passed through the fire and perfectly destroyed.

Inrolled, March, 1820.

To JAMES LEE, *late of Merton, Surry, for an Invention or Improvement in the Mode of Preparing Flax, Hemp, and other Vegetable Substances.*

THIS invention consists of four parts, viz. first in the breaking or separating the fibre from the boon or woody parts of flax, hemp, &c. either before or after it has undergone the process of dew rotting or water steeping. Secondly, in discharging the coloured matter out of unsteeped flax, hemp, &c. and bringing it into a fine soft and white state. Thirdly, in separating and dividing flax, hemp, &c. (when prepared) into its respective lengths, so that each length may be distinctly operated upon with greater facility by the slivering, drawing and roving machine, already in use, whereby very high numbers may be spun upon machinery. Fourthly, in drawing flax into a state which may be spun upon machinery sufficiently fine for the fabrication of cambric, lace, &c.

The first part of this invention, viz. for breaking, consists of a very large roller traversing upon a bed, either by a rotatory or reciprocal motion communicated by horse, water, steam or wind. The bed is proposed to be of cast-iron raised upon masonry, which bed is to be cut or cast in grooves, flutes or teeth, the periphery of the roller is to have corresponding indentations, and the weight of the roller may be about one ton. Upon this bed the rough flax is to be laid and submitted to the operation of crimping and bruising by the pressure of the roller, which is to pass over it several times. The patentee intends the foregoing apparatus to break flax upon a very large scale, but when smaller quantities are intended to be wrought, he constructs a smaller bed and rollers, with indentations as above described, in the form of Baker's patent horizontal mangle, and about that magnitude, to be worked by manual labour.

The process of scraping off the woody particles after the flax becomes broken, is performed by means of the scraping apparatus, described in Mr. Lee's former patent for flax dressing.

The second part of the invention, viz. that of discharging the coloured matter out of the flax, is effected by means of either of the above described machines, in which operation a stream of water is to be conducted into the bed whereon the flax or hemp is laid, and, by putting the rollers in motion, the coloured matter is pressed out: this process is to be begun with cold water, and when that is drawn off, replenished with warm, which may be continued by a pipe from a boiler until the water is boiling hot.

The third part of the invention consists in dividing the flax when prepared as above, and carefully hackled into equal lengths, so that each length may be operated upon with greater advantage than by machinery now in use for spinning. For this purpose a board is provided with several rows of points set up; upon this the hackled flax is laid and pressed by a small weight, when the flax is drawn out by hand, and carefully arranged according to its respective lengths.

The fourth part of this invention, is for drawing flax into a state by which it may be spun upon machinery sufficiently fine for the fabrication of cambric, lace, &c. for this purpose a board similar to the last described, is provided, but the teeth or points must be still finer; upon this the flax is laid, and children are to draw out a few of the fibres, and dipping their fingers in water, are to wet and twist the fibres together, which, by the gluten remaining in the flax, will cause it to adhere, and produce a fine and uniform thread, sufficiently strong to be spun by machinery.

Inrolled, May, 1820.

Original Communications.

On the Volatility and Inflammability which Fish and other Fixed Oils acquire by continued Exposure to certain High Temperatures.

THE chemical world has been lately much interested in a trial which occupied the attention of the Court of Common Pleas (SEVERN, KING, and Co. *versus* DREW or *the Imperial Insurance Office*) for three days during the month of April last. The action was for the recovery of £8000 and upwards, a loss incurred by a destructive fire which happened in the plaintiffs' sugar houses in Whitechapel, in November, 1819, and which were insured in the Imperial Insurance Office: the above sum was a part only of the total loss, which amounted to

£70,000. The insurance was special, and the premium paid was 14*s.* per cent.

The original and simple mode of refining sugar, is to place it in a pan with a fire under it. This, however, is very inconvenient, as it frequently happens, that that part of the sugar nearest the fire is burnt before the rest can be brought to a proper temperature. Ingenious and scientific men have contrived to produce the requisite degree of heat by pipes of boiling water coiled and immersed in the syrup or sugar. But in this process it is found that the sugar will not boil at the same heat as the water, and therefore a high pressure, attended with danger, is required. At Liverpool, tallow has been commonly used for this purpose; but it is extremely offensive, and to obviate its inconveniences, a Mr. Wilson invented a process, for which he took out three patents, one in 1816, another in 1817, and a third in 1818. This process consists in the use of fixed oil, which is put into a large retort, and from it a coil of pipes passes into the vessel containing the sugar, which is to be brought to the boiling state in order to be refined. The oil, it is said, requires a temperature of 600 degrees of Fahrenheit's thermometer for boiling, and sugar at most but 350. And this last temperature is supposed to be such, that no danger in the process can arise. A thermometer is, in this new process, fixed in the retort, and as soon as the oil is heated to a proper degree, it passes into pipes, which convey it through the sugar, till having done its office, it reflows back again into the retort. Valves are also placed in the pipes to regulate the passage of the oil. From the retort a small pipe ascends for the purpose of carrying off such air as might remain in the pipes, and in a retort not always full; and it is calculated, that, if any gas be generated, it must escape through this pipe. Every draught is carefully prevented which can impeed the operation of the process; and the fire is fed by external air admitted from behind it.

It was, in consequence of the use of this new process, that the insurance office disputed the payment of the sum insured. Upon inspection of the retort, however, after the fire, it was found without any rent or fissure in it, and with no other mark than that impressed by the superincumbent weight which had fallen upon it. When the fire happened, the new process had been carried on about three months.

A great number of witnesses were examined, but as our business is not with the question of the trial, but relative to the volatility and inflammability of fixed oil, we shall only state the observations of those persons who speak more immediately to these circumstances.

For the plaintiffs were examined, amongst many other persons, MR. H. WILSON, the patentee; MR. W. DOMFORD; MR. S. PARKES; MR. BRANDE; MR. ACCUM; MR. W. ALLEN; MR. BARRY; MR. C. SYLVESTER, and MR. J. T. COOPER. For the defendants, MR. S. WILKINSON; MR. FARADAY; MR. R. PHILLIPS; DR. BOSTOCK; and MR. ARTHUR AIKIN. Several of these gentlemen are well known to the public as able chemists and scientific lecturers at our public institutions.

MR. WILSON stated that the apparatus had been put up almost exclusively under his direction; that the ordinary mode of refining sugar was attended with both inconvenience and danger: both from its boiling over, and from its emitting very inflammable gases when in a desiccated state, At the degree of 344 inflammable gases were created; the boiling point was 245.* In the process in question, the temperature of the oil in the vessel never exceeded 360 for the working point; if it were to go beyond 440, the thermometer would burst. The boiling point of oil was about 600 degrees; and until it obtained that degree of heat, it would give out no permanently inflammable gases. To bring about such a degree of heat would require several hours of hard firing, and could never take place from negligence alone. Upon inspection of the apparatus after the fire, there was not the slightest indication of an explosion having taken place. The oil used was whale oil.

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* The boiling point of sugar we suppose here meant, is that which takes place when sugar is mixed with a certain quantity of

Mr. W. Domford stated, that he believed sugar, when heated to about 344 degrees, would produce a permanent inflammable gas, and that it would require a much greater degree of heat to produce vapour or inflammable gas from oil than from sugar. It would certainly require 582 degrees of heat to form gas from oil. He did not know whether the nature of oil was rendered more inflammable by being often heated. In all new oil there was a certain portion of water, and of course it did not inflame quite so soon as old oil which had been frequently heated. In heating oil for refining sugar he saw no danger whatever; the process for boiling sugar in the old way was extremely dangerous.

Mr. Parkes stated, that he agreed, with certain exceptions, to Mr. Wilson's statements: on the subject of gas from old oil he did not agree. He mixed five ounces of sugar with a proper proportion [how much ?] of water; and when the heat arrived at 230, the sugar and water boiled rapidly. The thermometer then remained stationary for a time, but afterwards moved slowly upwards to 340. A species of gas was then produced; but when the heat was raised to 370, the gas burned with a strong and permanent flame. When a heat of 590 was applied to old oil, it produced an inflammable but not a permanent inflammable gas. The lowest temperature at which inflammable gas was produced from oil, was

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water. No doubt sugar boils at a greater or less degree of heat, in proportion to the quantity of water with which it is mixed. See the conclusion of this paper.—Ed.

586, but it was not permanent inflammable gas: a non-permanent inflammable gas was a gas which would light if a match were applied to it, but which would go out when the match was removed. When the heat was raised to 600 degrees, a gas was produced from oil, which if touched with a match, lighted up, and continued to burn. This was the lowest temperature at which permanent inflammable gas was produced from oil. The difficulty of raising oil to 600 degrees in an instrument like that alluded to, would require a great effort for several hours; it was impossible, if the fire were left to work by itself, that so great a heat could be produced. New oil produced powerful gas at 608 degrees, and old oil at 590. All experience proved that old oil would burn sooner than new. The old oil he used was furnished by Mr. Wilson. If the oil in the retort were heated to any thing like 590 or 600 degrees it could carbonize the sugar; even 400 degrees of heat would produce that effect.

Mr. Brande stated, that he had made a few experiments on a small scale with oil. When the heat rose to 300 or 400 degrees, the sugar burned; upon applying some lighted paper to the oil, the paper was put out; he therefore concluded that sugar gave out gas much sooner than oil. He could not produce inflammable gas from oil under a less temperature than 600. If gas was generated in the retort, he did not imagine that it could produce danger; the new process appeared to him less dangerous than the old one.

Mr. Accum stated, that new oil emitted permanent inflammable gas at 600; it never emitted gas of that kind at a lower temperature. Old oil used again and again, would give an inflammable, but not a permanent gas at 580. If gas had been formed in the retort, it would not have been confined there, but would have escaped through the pipe. On placing two vessels, one containing a solution of sugar, and the other oil, in a similar degree of heat, when the temperature arrived at 350, the sugar produced a species of inflammable gas which ignited when a lighted body approached it; this could not be done with oil. In the new process the director had a complete control over the heat. It was impossible that the fire could be attributable to gas. If any explosion had taken place its effects must have been seen. He repeated his experiments several times and found no difference.

Mr. W. Allen, agreed in the main points with the preceding gentlemen; if the heat were increased to 400 degrees, there would be a risk of decomposing the sugar, and converting it into gas. Fixed oils, train oil, linseed oil, &c. were so called to distinguish them from the essential or volatile oil produced by distillation.

Mr. Barry, stated, that sugar could boil over at 250 or 260 degrees, whereas oil required 650 or 700 degrees to accomplish that object. He had seen a very inflammable gas from oil at 565, but not in any quantity; it required more than 600 degrees to produce any large portion of gas. New oil produced gas at 585 degrees; old oil at 568. Permanent inflammable gas was not a scientific term, it had not been used by him.

Mr. Sylvester stated, that he agreed with Mr. Wilson's evidence, and did not differ from him in any thing. He was present at certain experiments made on sugar and oil by Mr. Cooper. The oil was procured by Mr Wilson; oil which had been boiled produced gas at a temperature of about 20 degrees less than that which was new. The heat was 575 or 580 degrees before inflammable gas was generated. It would require two or three hours with the utmost care to raise the temperature so high; he thought it exceedingly difficult to produce such a heat by the new process.

Mr. Cooper stated that the lowest temperature at which elastic gas could be produced from oil in small quantities was 570 or 580; if larger quantities were wanted the heat must be raised much higher. He had never procured permanent inflammable gas under 610 degrees. If gas had been formed in the retort, it would have escaped by different apertures. There was a difference of betwixt 10 and 15 degrees of temperature between the heat at which old and new oil would produce gas. After the heat arrived at a certain temperature, it was most difficult to add to it;

in 40 minutes he raised the heat of oil from 20 to 350, and to raise it from 350 to 600 or 610 occupied nearly two hours and a half more. He did not know whether the oftener oil was heated the more inflammable it became.

Mr. WILKINSON, foreman to Messrs. TAYLOR and MARTINEAU, made experiments upon whale oil in a wrought-iron vessel. They wished to ascertain whether common oil, mixed with oil previously boiled, would produce inflammable vapour at a low temperature. A vapour with considerable noise began to rise at about 100 degrees; at 280 degrees a light was several times applied to the top of the tube, the vapour then took fire with sudden gusts, as with an explosion in the boiler; by explosion he meant a noise like that of fat boiling, it burnt only when a light was applied to the tube. When a candle was held to the vapour, it assumed an appearance like that of lightning; the thermometer broke at a temperature of 348 degrees, but with some circumstances which, it appears to us, render any inference from the fracture doubtful. In another experiment which was made with 33 gallons of new whale oil, and continued during twelve days, the fire being kept up eleven hours every day, and the boiler suffered to cool during the night, the highest degree to which the oil was heated was 507. On the first day 380 was the highest, and no inflammable vapour was produced; on the second day the temperature was 375, and at that degree the air appeared slightly inflammable; on the third day at 395, were no symptoms of inflammability; but on the fourth, the lowest temperature at which it was produced was 348. At 360 the vapour took fire on the application of a light, and it was remarked that a difference was created by the slow or brisk burning of the fire. At 380, with a slow fire, the vapour was scarcely inflammable, but, with a sharp one, was highly so at 360. On the fifth day, inflammability appeared at 365, 360, and 345. On the sixth day, the vapour was highly inflammable at 345. On the seventh day twelve gallons of oil were taken out of the boiler, in order to make the experiment as fair as possible. The highest degree to which it was that day heated was 390; but at 335, it threw out a slightly inflammable vapour. This was the lowest point at which it had been hitherto observed. He was, at the commencement, desired not to raise the temperature above 100; but after the quantity of oil was reduced on the eighth day, he raised it to 500. Inflammability took place at 360; at 500 the vapour extended seven inches above the tube. When a light was applied to it, it had the appearance of lightning. The vapour took fire on the ninth day at 497; and the heat rose 140 degrees in fifteen minutes. On the tenth day the vapour became inflammable at 345 degrees, and spread, as before, like lightning. At one time on the same day it appeared as inflammable at 360 degrees as at another at 500. On the eleventh day it became inflammable at 310 degrees. On the succeeding day slightly so at the same point. A similar experiment was continued for twenty-three days, during twelve hours every day. He did not make use of an hydrometer, nor remark the atmosphere. The fire-place was twenty inches long, ten inches wide, and there was a space of ten inches from the bottom of the boiler to the fire bars.

Mr. **Faraday** stated, that he had lately made various experiments upon oil, and that it emitted a vapour denser than the atmosphere; it also threw out gas at a temperature of 340, and caused various combustions before it arrived at that degree. The result of these experiments was, that the use of it for the purpose of refining sugar, or the circulation of it when heated through any medium, must be attended with considerable danger. He had found too, that sugar would throw out gases at a temperature of 240 degrees; oil after distillation, was rendered more volatile and inflammable than before, and the vapour would explode frequently without any noise.

Mr. R. **Phillips** stated, that a volatile oil was created from fixed oil, by the application of heat; aqueous matter was formed during the decomposition. He was of opinion that there was great danger of an inflammable gas communicating with the external air. His experiments were made in a retort which contained about twenty gallons.

Dr. Bostock described an experiment which he had seen in Whitecross-street, (the same we apprehend as related by Mr. Wilkinson,) and which lasted for twenty-three days. The temperature of the oil was raised in twenty minutes, from 360 to 460, at which point it threw out some highly inflammable vapours and also jets of flame. He thought that a conflagration produced by it would exhibit appearances similar to those which were described to have actually taken place at the fire in question. His judgment was the result of enquiries on a small scale.

Mr. Arthur Aikin stated that he had, four or five years since, made some experiments on oil: the oil he chiefly used was whale oil, which was of a viscid and gelatinous nature, and contained a great deal of animal jelly; this, when exposed to a temperature that blackened it, was decomposed, and produced a very volatile and inflammable oil. By distillation this inflammable quality was greatly increased, and if poured into the hand it would evaporate like spirits of wine. When a viscid fluid, like whale oil, was exposed to the action of naked fire, its carbonaceous substance was decomposed, and formed a stratum at the bottom. There was an accumulation of heat in this stratum much greater than the degree indicated by the thermometer placed in the fluid above. There was always a risk that the boiler would give way under the pressure of the volatile oil; it was a dangerous and unmanageable fluid, and the more frequently it was subjected to the action of fire the more volatile and inflammatory it became; insomuch that combustion would be produced at last with a very small degree of heat, and an accident might easily happen. He should conceive that the moment an explosion was most likely to take place, was when after the volatile oil had been detained by the mass standing to cool all night, the fire was applied on the following morning before the pump was set at work.

The Jury found that the fire did not originate in the place where the new process was carried on, and that no increased risk was caused by the introduction of that new process. Damages £7200.

A variety of important reflections must necessarily arise from the evidence given by the several scientific gentlemen as above. The Lord Chief Justice on the trial, regretted to find such respectable witnesses not drawn up on one side, and for the maintenance of the same truths; but, as it were, in martial and hostile array against each other. And it is to be lamented that such should appear to have been the case: but upon a careful examination of the different statement, we think that it is fully clear, little was comparatively known of the volatility and combustibility of the fixed oils, and the changes which they undergo by being repeatedly heated, till the fire which occasioned the present inquiry happened. That different results should be obtained by different persons, operating with different materials, different quantities, and in different ways, is not at all surprizing. We cannot permit ourselves to doubt that the several gentlemen have stated correctly what they have observed, but the results being so dissimilar, we are obliged to conclude that the *same means* could not have been adopted in the several instances to obtain them. The oil itself may be different in quality; the mode of determining the degrees of heat may be different; the thermometers may be different; the vessels in which the processes were conducted, and a numerous *et cætera*, which the scientific perfectly understand, *must have* been different, or such anomalies could not have taken place.

We entertain no doubt as to the correctness of the verdict of the jury; but we do, notwithstanding, entertain a very great doubt of the utility of the new process of Mr. Wilson's for refining sugar. Admitting that no danger arises from the oil itself being heated to 500 or even 600 degrees of heat; according to the statements of some of the witnesses, sugar is convertible into gas at 344 degrees; and Mr. Accum states, that when the temperature arrived at 350, sugar produces a species of inflammable gas, which ignites when a lighted body approaches it; and Mr. Parkes also mentions that a mixture of five ounces of water with a proper proportion of sugar, boils at 230; that the thermometer was stationary for a time, (no doubt while the evaporating water carried off the superfluous heat,) but it afterwards moved slowly upwards to 340 degrees; that a species of gas was then produced; and that when the heat was raised to 370 the gas burned with a strong and permanent flame.

How, therefore, are we sure that the heat of the sugar might not occasionally and unexpectedly rise to this point, and from the accidental access of some burning body, a candle, for instance, might not a dreadful conflagration be the result? If we were at all disposed to speculate upon the cause of the late fire, we should be more inclined to suspect that it originated from the decomposition of the sugar than of the oil. Of this, however, from circumstances impossible now to be known, we cannot form an accurate estimate. We doubt not that chemists will now turn their attention to the acquired volatility and inflammability of the fixed oils, from being heated, and that from their various experiments, *not made to favour a particular hypothesis*, considerable information and advantage will be derived: more especially as the application of fixed oils to purposes till lately unknown, rendered such experiments necessary.

To the Editor of the Journal of Arts and Sciences.

SIR,

As animal heat is a branch of physiology which deserves the most minute investigation, from its connection with health and disease, I would propose a few enquiries on the subject, hoping they may induce some abler pen to take it up.

The most important enquiries on this subject are such as these: first, The sources and causes of animal heat; second, The diffusion of it through the animal frame; third, The quantity necessary to health, and that superabundance which constitutes disease; fourth, The retension and dissipation of that heat, as it refers to the promotion of health, or inducing a distempered state of the body; fifth, What connection electricity may have with animal heat; sixth, In what way substances, applied to the body, whether externally or internally, affect the reduction or increase of the animal heat. These enquiries I cannot presume fully to answer: nevertheless, a few thoughts may awaken in the minds of others ideas which may further illustrate the subject.

It is needless to mention the various theories which have been proposed, as experiment has pretty well determined that the chief source of animal heat is from the decomposition of atmospheric air in the lungs, when the caloric which it contains is liberated and diffused through the whole system. As oxygen has the greatest affinity for caloric, (generally speaking) the heat of the body is in proportion to the quantity of oxygen received into the lungs. Pure oxygen inhaled will raise the temperature of the body to a very high degree. But admitting this to be fact, an enquiry remains, whether on this ground all the varieties of heat in the human body can be attributed to this cause. The body is sometimes raised to a great degree of heat by exercise, by fever, and, partially, by friction. By exercise we respire more quickly, consequently, take in a larger portion of atmospheric air, and as exercise increases the action of the lungs, the action of the heart, and the circulation will be also increased. The same thing takes place in fevers: for as there is then less evaporation, and the heat is not carried off, the retained heat excites general action, and as the respiration is also increased, more air of course is inhaled. But there are some phenomena connected with this subject which render it abstruse and difficult: animal heat, it is well known, rises uniformly in all climates to a regular temperature, or very near it, 98 degrees of Fahrenheit being the medium standard; and the human system can endure a degree of temperature even as high as 300 of Fahrenheit without injury, and still nearly preserve its own, although the pulse and the action of the lungs are greatly increased, yet no oppression in respiration follows. From whence can it arise that the body has power to maintain its coolness under such circumstances? Is it from excessive evaporation, or from the extreme rarefaction of the air that enters the lungs containing little oxygen, or from both these causes united? In cases where the air is rarefied without the application of heat the system is exceedingly oppressed, and respiration is laborious.

The second enquiry, viz. the diffusion of heat, is of the utmost importance, and is attended with numerous difficulties. Although it appears to be the design of nature to maintain an equal temperature in the viscera, and in all the vital organs, yet a much lower degree in the external parts of the body is more consistent with health: for nature's great intention in evolving heat from the system, is to carry off the finer excrementitious particles not evacuated by the general outlets, to prevent disease and putrefaction. It may be enquired here, whether the arterial blood accomplishes the diffusion of heat through the system in circulation, especially in the capillary vessels; or, are the nerves the principal conductors of heat, or may both be considered as causes? When a large nerve is paralysed, there is some deficiency of heat in the surrounding parts: does this arise from the want of muscular action, which is connected with sensation? Difficulties occur here: among these, are inflammations, especially local ones; the sudden flushes of heat, and sometimes sudden sensations of cold; and also the unequal distribution of heat when one part of the body is very hot and another very cold without any external cause. Such is the nature of heat, that it is always more or less disposed to radiate and diffuse itself around, every thing within the sphere of its influence soon becoming of equal temperature. It appears likewise, that caloric may exist a long time in a latent state, and may be gradually roused to action, or suddenly liberated by the decomposition of the substance containing it. Many facts corroborate this, but how far this may take place in the animal body, remains to be enquired into. Instances have occurred, where, by taking mild acids into the stomach, most powerful effects have been produced, by liberating heat, swelling the glands of the trachea esophagus, nostrils and eyes, producing a considerable discharge, besides a general pricking and heat over the whole skin, and a rising into small watery pustules. The same effect has been produced in some constitutions by taking the submuriate of mercury: it has produced considerable swellings and large blisters in the hollow of the joints. Many things may have taken place of the same kind, and the phenomena being strange and apparently unaccountable, there was probably no enquiry made into the cause.

Thirdly, the quantity of heat necessary to health, and that superabundance which constitutes disease. This is a point of which many who profess physic seem to be totally ignorant. They imagine, that if the vital heat is at 98, all animal bodies of that temperature possess the same quantity of heat. Nothing appears to me to be more false and absurd, and at the same time of more consequence in physiology. It is true there is the utmost difficulty of ascertaining the precise quantity which any animal body contains; neither is there, I believe, any method that can be adopted to make such measurement: but there are certain laws in nature which may, perhaps, equally apply to the living system as to inert matter. It is an established fact that some bodies contain a much greater quantity of caloric than others, and yet continue at the same, and even at a lower temperature. Some bodies are good conductors of heat, and freely part with it, while others tenaciously retain it. These seem similar to electrics and non-electrics. A known law of nature seems to apply here, that when fluids become solid, they give out a quantity of caloric, and when they become fluid they imbibe the same quantity which they lost. As this phenomena is continually taking place in the animal body, that is, probably, subject to the same law. But there is another law which seems to oppose and counteract this, viz. that dense fluids will retain heat longer, and hold more in quantity than lighter ones; nor will they so soon fly off in vapour. By this law it would follow that the denser the blood and humours in the body are, other circumstances being the same, the more heat it will possess. In this respect animals differ extremely; while some are roused into a violent perspiration with little exercise, others will continue long without being much affected. As far as this depends on the density of the blood and humours, it is a question in physic. As neither of these are homogeneous, but vary much in quality separately, as well as with each other; and as they differ much in density, every secretion may make a variation in the heat as well as in the capacity for it. It seems to be most important in the various operations of nature to proportion the quantity and degree of heat to every purpose and intention. Fermentation, putrefaction, incubation, &c. &c. all require proportionate and different degrees of heat to produce their proper effects. There is not a doubt, I think, that each and every secretion of the animal body requires a proper degree of heat adapted to its healthy state: any variation of heat, whether too much or too little, may produce disease. Nature seems to have placed the various glands where they may possess different degrees of temperature for this most important purpose. Vegetation requires degrees of heat in proportion to the nature of the plant and flower; hence a continual succession according to the season of the year and other circumstances.

With respect to the superabundant heat in the human body, which appears to be the cause of diseases of the inflammatory kind, it may come more properly under the fourth enquiry of the retention and dissipation of heat.

Admitting that the principal cause of animal heat arises from the disengagement of oxygen from the atmospheric air in the lungs, and that the general heat of the body is in proportion to the quantity inhaled, yet various other circumstances conspire to increase or decrease that heat in the body as already stated. It may be possibly chemically combined with some of the fluids, and continue for some time in a latent state, till some process in nature, or other circumstances concur to liberate it, when it may spread through the whole system. May not this be the case in intermittents: for no theory which I have seen, satisfactorily accounts for them. The different humours of the body may very materially vary in their capacity for heat in different states of density or fluidity, or in proportion to their quality. Sometimes they may retain their heat with great tenacity, while at others they may throw it off abundantly. One body, possibly under the same external circumstances as another, may evolve a double quantity of heat in a given time; consequently, unless there is a double supply, there must soon be a great deficiency to the prejudice of the healthy state. This is a matter, I fear, which has not been sufficiently attended to. We can readily conceive that an atmosphere, which would abstract the heat that could not be spared from one person without injury, might relieve another of a great burthen. Hence different kinds and quantities of clothing are required by different persons, and even by the same person in various states of health. I think it is obvious that some parts of animal bodies have more capacity for heat than others, that they differ also in their powers of retention. The lungs, from their spongy substance, quickly evolve heat; but when, in certain subjects, their operation is impeded, and due evaporation does not go on, inflammation takes place. The heart being in the centre of the system, and supplied with the greatest heat, and being a vital part, it is most probably necessary that the heat there, should be maintained at an equible temperature: and as its substance differs materially from every other organ, and its being endowed with a great degree of irritability, has it not less capacity for heat and the retention of it, than any other part of the body? Its being surrounded by a peculiar liquid may also contribute to preserve an equilibrium of heat so necessary to the safety of animal nature.

The fifth enquiry is, what connection may electricity have with animal heat. Electricity is so subtile a fluid that it is difficult to obtain any knowledge of it but by its effects. Many disputes have arisen which are not yet terminated. But certain it is, that a large quantity of electricity being thrown into the human system quickens the pulse, increases the vital heat, and invigorates the body. On the contrary, when electricity is taken from it, the muscular force is diminished, the spirits flag and lose their energy. There may be, probably, states of the blood and humours wherein they may neither receive nor retain electricity. Of this I am assured, that when they are in a morbid state, they are non-conductors. I have seen a person insulated, from whom sparks could be taken in every part but the one that was ulcerated. As the conductor approached the ulcer, the sparks became weaker, and none could be drawn from the morbid part; when the wound healed, the sparks passed as in other places. Is it not then very probable that, in many morbid states of the animal fluid, heat will not be sufficiently retained for the purposes of health?

Since the discovery of galvanism, or galvanic electricity, it is found that the galvanic process is continually going on in the animal system, especially with the least degree of muscular action, and upon every movement heat, of course, must be evolved. Heat is sometimes suddenly produced when a single idea causes the whole frame to thrill with passion: or a sudden coldness, when an idea crosses the mind which checks the blood and fills the soul with horror and dread. May not the heat be as quietly changed into a latent state, as suddenly liberated and diffused? Without doubt one person may contain more electricity than another: when electricity is abundant, may not such possess more spirits and vigour than those who have less? May not electricity be considered as caloric, or the matter of heat in a different state of modification? It seems, at least, to be under the same or similar laws with caloric.

Lastly, in what way do substances applied to the body, whether externally or internally, effect the reduction or increase of animal heat?

The radiation, transmission, and circulation of heat, have been the subject of various experiments, more or less decisive: but, as the conducting power of bodies differ so much, experiments must be multiplied almost *ad infinitum*, to come to a perfect knowledge on this subject. Every metal differs in its conducting powers: make the ends of two bars of equal dimensions, the one of copper, and the other of iron, red hot; the copper bar will be hot to the extreme end not in the fire, while the iron will be nearly cold. So of liquids: some will soon become hot throughout, while others must be stirred to become equally hot. There is a general disposition in heat to diffuse itself or maintain its equilibrium. A body that contains more, parts with it freely to that which contains less, and *vice versâ;* but the quickness or slowness of this process, is regulated according to the attracting or conducting power of the body, which contains the least. If iron or stone come in contact with an animal body, a large quantity of heat is drawn off in a short time; but wool being placed in the same situation, and at the same temperature, takes from the body a very small portion, because it is a bad conductor of heat. A good conductor may therefore very soon deprive the body of the greater part, or the whole of its heat, and thus induce death.

The conducting power of the air is so small, and acts so slow, that notwithstanding its fluidity, which renders motion among its parts so ready and free, yet the smallest distance will make a very material difference in its sensible heat of several degrees by the thermometer. The air must be much agitated before its temperature will be at all equal, and then, probably, the equilibrium arises more from the change of place of the air itself, than the transmission of heat among its particles. Heat has also a greater tendency to ascend than to pass laterally or downwards. This may arise from its levity, or in proportion as the air is expanded by it, so that the rarefied air takes up the heat with it. When hot water is mixed with cold, a slight degree of agitation will make it of equal temperature. When water is raised into steam, it is a good conductor indeed, and carries off a very large portion of heat. It is this tendency to equilibrium that is the cause of the reduction and elevation of heat in the human body, on the application of different substances to it. A good conductor takes away a large portion, and quicker than the animal powers can furnish it. A bad conductor may not attract or receive heat enough to relieve the animal system from its burthen, and those noxious particles which should pass off with it may be retained. Substances may be received into the stomach, which by absorbing heat and retaining it in a latent state, may reduce the vital powers, and being again suddenly liberated, cause inflammation and perhaps death. It appears that those who wish to maintain a permanent state of health, should pay a strict regard to what is generally called the non-naturals, as they produce the most powerful effects in the human system, either to promote and establish health, or introduce disease. Upon the whole, it seems very desirable to obtain further light upon so important a subject, which concerns the health and welfare of the human race. Your's, &c.

Z. W. VINCENT.

Little St. Thomas Apostle.

To the Editor of the London Journal of Arts and Sciences.

The following is a description of my invention to prevent gas consumers from burning a greater quantity of gas than they may have contracted for. With the socket of an ordinary gas burner, I place what I call a regulator, screwed in with one small hole, perforated through the middle. Now I propose, that these regulators, placed in the neck or socket of the burner, should have a hole of an exact size, so as to consume any certain quantity of gas, under a certain pressure, whether there be twelve or eighteen holes; or, let the holes in the burner be made larger, still to consume no more gas, as the passage through which the gas passes, by means of this regulator is limited, I propose that these regulators should be screwed in after the same manner as patent screws for coffins, which will not screw out again; and that these regulators, when ready for putting into burners, shall be case hardened, which would prevent the consumer from widening the hole. Any kind of burner may be regulated by this means, to the greatest exactness; there will be a little trouble to find the exact size, the hole in the regulator should be, but when that is once done, it will answer for all burners. I have tried the experiment, and find it answer well, and I am persuaded this hole will not clog up, because the warmth of the light will keep it clean, though not hot enough to soften the regulator. I have suggested this contrivance to the gas company here at Leeds, who are going to have all their burners furnished this way.

A speedy method of making these regulators is to cut a screw upon a long piece of iron wire, and saw off small lengths and bore them, then case harden them thus: take old leather and burn it, then powder it, and put a quantity of these regulators into an iron box, and bury them over in this burnt leather, then put them into the fire, and when all is red-hot, tumble them into a vessel of cold water.

JOHN BAYNES.

Brig-Gate, Leeds.*

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* Mr. Baynes has, since communicating the above, removed to Blackman Street, Southwark.

Novel Inventions.

Messrs. PERKINS, FAIRMAN *and* HEATH'S *Siderography,*
versus
SIR WILLIAM CONGREVE'S "*Compound Plate.*"

SINCE the publication of our last number, a very extraordinary work by Sir W. Congreve† has made its appearance; for which the public as well as Messrs. Perkins and Co. are, most certainly, very much obliged. The object of Sir W. Congreve, is to prove the inadequacy of Messrs. Perkin's and Co.'s plan for the prevention of the forgery of bank notes, and the great superiority of a plan of his own, which he denominates the *com-*

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† An Analysis of the true Principles of Security against Forgery; exemplified by an Enquiry into the sufficiency of the American Plan for a new Bank Note; with imitations of four of the most difficult specimens of those notes made by ordinary means; by which it is proved that there is no adequate security to be achieved in one colour in the present state of the arts; and that the true basis of security is in the due application of relief engraving and printing in two or more colours. By Sir W. Congreve, Bart. M. P. A. M. F. R. S. 8vo. pp. 56.

pound plate; in which *two* or *more* colours are used, and that security from forgery is absolutely and in all points effected by it. It consists in the application of certain principles, which Sir W. has lately given to the public in a small volume, on the formation of a new description of coin, not to be counterfeited without immediate detection. The plates are made of two metals, whereof one must be brass, copper, or other metal at least as strong. The design is at first drawn on the brass plate; the parts in which it is intended to introduce the second colour, are then cut in the most delicate filagree. A second plate is then combined with the first (by a process not detailed) the parts of which are filled up most accurately into all the interstices of the brass plate; and indeed the fineness of the filagree is, Sir W. informs us, by hypothesis, such that the combination can only be formed by this particular mode of uniting the two metal plates. These plates are then engraved as one: and, for printing, are fixed in a press of peculiar construction, so that they may be separated to receive a *different* coloured ink on *each* plate, and unite again to print whatever work may be engraved or otherwise placed upon them, in two colours *at one impression.*

Sir W.'s work is chiefly designed to point out the advantages of this new system; but, unfortunately, that which can enable us, or the public to judge of its utility or importance does not accompany it: we mean, of course, a specimen or specimens of this "compound plate," which is to be so complete a panacea for all forgery. Leaving, therefore, Sir William Congreve's "compound plate" to speak for itself, whenever specimens of it are before the public, we take our leave of this part of the subject, and advert to what has come before us, not only in a tangible but in a visual manner.

In a postscript to Sir W.'s book he has thought proper to notice our humble labours, and insinuates, that the article in our last concerning Messrs. Perkins and Co.'s plan for the prevention of the forgery of Bank notes was either written by the American artists or by some friend of theirs. The first insinuation we deny; and if by "friend," Sir W. Congreve mean a person who admires the plan, and thinks it highly deserving of public attention and patronage, we plead guilty to the charge; but if by "friend" he would insinuate a person who is desirous of serving Messrs. Perkins and Co. beyond what the intrinsic merits of their system deservedly warrants from the public at large, this also we deny, and really think that not even a Baronet, an M. P. and a Commissioner for the prevention of Forgery has a right to make such a charge against any public journal. So far from being partizans, we can most cordially assure Sir W. that if he should think proper to communicate to us details of his plans relative to the prevention of forgery and his "compound plate," we will most cheerfully lay them before the public in our columns.

Notwithstanding all Sir W. says, we must still be permitted to consider those imitations of Mr. Branston's, to which he so triumphantly alludes, and which accompany his work, as "*total failures;*" and are really astonished that he can assert, "that if both original and imitation were printed on bank note paper, the one would not be known from the other."

We have no particular desire to enlarge here, upon Messrs. Perkins and Co.'s plan, as the specification of their patent will be found in the present number; and in our former numbers, we have stated our candid opinions; but as the advantages, even on the score of economy, which the plan possesses, are important, we present our readers with the specimen plate X, being an impression taken from a hardened steel plate, from which more than twenty-five thousand impressions have been taken without repairing, before our number was printed off, proving the durability of such plates; whereas, copper with the same work upon its surface, would not produce five hundred legible prints. The identity of this plate may be traced in the numerous impressions with which several of the popular periodical publications have been furnished, by an accidental flaw in the steel, at the corner.

To say any thing can be produced by human means which may not in a distant degree, and with great labour be imitated, would be absurd. It therefore follows, that the plan which affords most protection to Bank notes, is that which throws the greatest difficulty in the way of the forger. One of Sir W.'s imitations he has acknowledged, took seventeen days, the other thirty-three days and a half, to execute by the first talents in London. What time would it take a forger in private, without help, and a rope round his neck?

In conclusion, we would add, that the openness, candour and communicativeness of Messrs. Perkins and Co. exceed all praise. That Sir W. Congreve having in his work expressed regret that he had not the means of affording the Public an opportunity of comparing the originals with the imitations of certain specimen bank notes executed by Messrs. Perkins and Co. these gentlemen, wishing the *security* of their plan to be thoroughly investigated, offer to furnish every purchaser of Sir William Congreve's work with the original notes, free of expense; and are desirous of giving the greatest possible publicity to Sir W.'s published imitations.

In a word, until better plans are before the public we must continue to say, that we believe Messrs. Perkins and Co.'s is unrivalled; and we sincerely hope that Sir W.'s "Compound Plate" will not prove *vox et preterea nihil.*

Polytechnic and Scientific Intelligence.

GREAT BRITAIN.

Royal Academy.

On a superficial inspection of the catalogue of the Exhibition of this National Institution for the encouragement of the fine arts, now open to the public for the present year, being the *fifty-second* from its foundation, it has occurred to us, that either the British people are a very vain people, or that the domestic affections have obtained amongst us a prepollency, which in other times, if in existence, have not been so conspicuously exemplified. We allude to the abundance of *portraits* in the present exhibition; many of which, although of public characters, yet others, and by far the greater number, are distinguished by nothing which immediately concerns the public, except mere personal charms, elegance of figure, or the particular taste and execution of the painter. And in order that we may escape the first imputation, we most sincerely hope that filial, paternal, or conjugal affection or friendship has prompted the painter's pencil to delineate these resemblances of beloved objects, as memorials to awaken or perpetuate sympathies and attachments which too often the rigid hand of death either benumbs or destroys.

The present exhibition consists of rather more than 1000 pictures; about 500 of which are Portraits. Of these, one of the best, although a small one, is No. 39, *a Portrait of the late* E. **Bird**, Esq. R. A. *painted in* 1817, by **Rippingille**. Those of our readers who are desirous of contemplating truth, nature, and effect, should examine minutely this excellent specimen of all the great requisites in this charming art. The lamented artist is painted, not in the demure form of *sitting for his picture*, a situation at all times much to be deprecated, but in the active occupation of his art, in which both his corporeal and mental faculties appear to be deeply engaged.

The *Portrait of His R. H. the late* **Duke of Kent**, by **Sir W. Beechey**, is a fine Picture; the same may be said of His R. H. the **Duke of Gloucester**, by **G. Beechey**. Those of **Earl Grey**, and **H. Brougham**, Esq. M. P. by **Phillips**, are good. The calm dignity of the house of *Russel* is well pourtrayed in the **Duke of Bedford** by **Raeburn**.

We like the style in which *the* **Duke of Wellington**, *attended by his Aide-de-Camp*, **Lord G. W. Russel**, is painted by **Hayter**: we would much rather see his Grace in an undress, than decorated with all the insignia of the orders which his valour has procured for him.

Of the *Portraits of* **John Abernethy**, Esq. *by the President*, **Sir T. Lawrence**; of **Canova**, *the celebrated sculptor, by* **Jackson**; of the R. Hon. **N. Vansittart**, *Chancellor of the Exchequer*, by **Joseph**; No. 246, *Portraits of a Lady and her Daughter*, by the same artist; No. 177, *Portrait of a Lady*, by **Sir W. Beechey**; of **Francis Jeffrey**, Esq. by **Geddes**; and of **Lord Colchester**, by **Lonsdale**; it will be sufficient to say, that they will do the painters credit.

Of No. 599, *a Portrait of* **Mrs. Cooke**, by **Halls**, we can scarcely speak in terms of sufficient commendation. We do not happen to know the lady; but if the painter has succeeded as well in the delineation of her features, as he has in the execution of the picture as a whole, we must conclude that he has arrived at the *ne plus ultra* of his profession.

In No. 300, *a Portrait of an Officer in the first Regiment of Loyal London Volunteers;* and No. 137, *a Portrait of* JAMES HENDY, Esq. both by M'CALL, we observe indications of merit, which, we trust, may demand from us, in some future exhibition, more extensive approbation.

There are two portraits of Sir W. GRANT, late Master of the Rolls; one by Sir T. LAWRENCE, and the other by PHILLIPS. Comparisons are, it is said, odious; in this instance we can say, however, that both are good, but that by Phillips, has some preponderating traits.

Of No. 466. *Venus and Cupid, enamel, after the original of* PAUL VERONESE, by BONE, to say the least, they are lovely. But whether such enamels or paintings ought to be *exhibited* at the Royal Academy, how truly soever emblematic of the most ecstatic of the passions, is a question which we leave the Royal Academicians themselves to solve.

The *Historical Pieces* are not numerous. One of the best is No. 152, *Christ Raising the Daughter of Jairus,* by THOMSON. Another, No. 416, *Jeroboam's Idolatry reproved,* by BONE: although we are not quite convinced that the whole is in exact keeping, yet both this, and the preceding, as exemplifications of the intervention of supernatural power, possess an intensity of interest and effect of no common kind.

No. 311. *The last Scene in Massinger's Play, of a New Way to Pay Old Debts, with Portraits,* by CLINE, is one of the best pictures in the present exhibition.

No. 141. *Scene from the Play of Henry the Fourth;*

Portrait of the late J. MADOCKS, ESQ. as Falstaff, by BRIGGS, does the poet, the actor, and the painter credit.

Of No. 151. *The Reading of a Will*, by WILKIE, we have scarcely occasion to speak, because from its excellence, we suppose there are very few persons at all interested in this branch of the fine arts, who have not heard the *buzz* which such pictures so exquisitely done, rarely fail to produce.

No. 11. *The Travelling Tinker*, by KIDD, and No. 215, *Bargaining for China*, by INGALTON, are convincing proofs that both these artists have well studied nature.

In *Landscape*, SAMUEL, in No. 439, *View from King's Weston hill of the junction of the Avon with the Severn;* and in No. 545, *Evening: a View under King Weston hill*, maintains the credit for fidelity, and truth of colouring, to which some of his former pieces have justly entitled him. The sunshine and shade of the first picture are striking and appropriate; and the dust made by the horses of a timber carriage descending the hill, rises in the air, so that we almost anticipate its suffocating effects.

In No. 347. *Londoners' Gipsying*, [will our provincial readers understand this?] we wish MR. LESLIE had been as happy in the execution of the foliage and trees, as he has been in the faces of the picture. We must, however, do this artist the justice to say, that we think it might be hung in a bad light.

We like No. 337. *Fox Hunting: calling the Hounds out of cover; portrait of* R. LAMBTON, ESQ. *his horse Undertaker, and hounds*, by WARD, not indeed because it is fox-hunting, which we do not like, but because the picture, as a whole, is good: even without the portraits it is an excellent landscape.

In a *Carpenter's Yard at Enfield*, No. 333, by HILL, are many of the essentials of good painting.

What shall we say of No. 271. *Ettrick Banks—the junction of Ettrick in the Yarrow, with the Tweed, Abbotsford, the seat of Sir Walter Scott, in the distance, by* WILSON?—ETTRICK, YARROW, TWEED, and WALTER SCOTT, are names around which so many halos of fancy play, that it is difficult to retain correct vision in viewing this Caledonian landscape; but it must be, nay, it is good.

No. 264. *A distant View of Greenwich from Charlton Wood near Woolwich, by* NASMYTH, we happen to know is a faithful delineation. And No. 266. *The Setting Sun;* composed from a scene in Richmond Park, by R. R. REINAGLE, must please all ardent and enthusiastic admirers of nature.

In No. 344. *The Green Grocer,* a term, by the way, scarcely understood in the provinces, MR. GRAHAM has done well; but does this Green Grocer live in town or country?

The *Brook Scene at Linton, North Devon, by* LINTON, No. 451, is to us, who know the Valley of Rocks and its neighbourhood well, a tame picture. Why do not our artists turn their attention to this part of the island, and bring the metropolis acquainted with some of the sublimities and beauties of our western Alps? Mr. Samuels did something in this way last year. Minehead, Dunster, Porlock, Dunkery, and the lofty undulating range from Porlock to Linton, thence to Ilfracomb, afford rich and inexhaustible subjects for the pencil. An artist, who is desirous of obtaining the most interesting views in this part of England, should visit it in August, and if possible in wet and stormy weather.

Of *Sculpture,* with one or two exceptions, we have to report favourably.

No. 1000, *Victory: Part of a Monument to the* *memory of General Sir W. Ponsonby, for St. Paul's Cathedral. Modelled and executed in marble from the original design by the late* W. THEED, ESQ. *by* E. H. BAILY, is a very conspicuous figure in the Model Academy. It gives us much concern to be obliged to say, that we cannot approve of the execution of this statue. Is it a male or a female figure? If a male, the head is too small, if a female, the arms are out of all proportion. *Wings* are also attached to the shoulders! We should have thought that the chaste conceptions of British artists in the nineteenth century, would not countenance such a departure from nature and common sense. When Mr. West painted *Death on the Pale Horse*, he did not paint the King of Terrors as a *skeleton*. If there be any of our artists, who yet suppose, that in the personification of any of the virtues, &c. they must make such personification a *monster*, we lament it: but it is neither natural nor just. Inasmuch as the *ancients* studied nature, we ought to follow their steps; but if in such figures as these they departed from her, we ought not to follow them:

Humano capiti cervicem pictor equinam,
Jungere si velit, et varias inducere plumas, &c.
Vide HORAT.

The busts by CHANTREY, seven in number; viz. of G. PHILLIPS, ESQ. M. P.; LORD DUNDAS; SIR A. MACDONALD; G. W. TAYLOR, ESQ.; RIGHT HON. C. LONG, M. P.; LADY NUGENT, and J. FULLER, ESQ. will support the fame and eclat which this eminent artist has so deservedly obtained. His *Sleeping Child*, No. 1062, is a beautiful specimen of infantine nature.

No. 1063. *Religious Instruction, a Basso-relievo in marble, for St. John's Church, Manchester, by* FLAXMAN, cannot be contemplated without a perfect conviction that sculpture has arrived in this country at a state in which it will not soon be easily excelled.

A bust of the late President, by BÉHNES is good: so also is an *Idea for a Monument to his memory by* GOTT.

The *bust of his late R. H. the Duke of Kent, by* TURNERELLI, is well executed, and a good likeness.

These are the only productions in the present Exhibition which we have room to enumerate. There are, however, many others of great merit and rich deserving. Some pieces there certainly are, which might have remained in the cabinets of the artists, or their portfolios, without any injury to their fame: such serve in this Exhibition as foils to set off better pictures. Unavoidable as this, perhaps, sometimes is, we suppose that no *faber imus*, would be willing to submit to such an employment of his pencil. Excellence is, or ought to be, the object of all professors of the fine arts. Perhaps if this exhibition had been made more select, it would have answered quite as well, if not better, for the artists themselves, as well as for the gratification of the public.

Society of Arts.

IN the course of their sessions the Society of Arts have voted rewards, either of an honorary or pecuniary nature to the following, in addition to those noticed in our last.

In Mechanics.

Mr. Hookey, for various improvements in naval architecture, viz. in the construction of ships' rudders, generally; also in the construction of substitute rudders, in case of accident, out of materials belonging to the ship;

and also for bending timber for ship-building, and giving additional strength to old vessels of large burthen.—Mr. Edwards, for apparatus intended to propel ships of war in a calm, and also to assist in working the pumps.—Mr. Smith, for his method of supplying water in case of conflagration.—Messrs. Jeffries and Halley, for a powerful blowing machine.—Mr. Jopling, for his improved method of forming the ribs and running mouldings of groined arches.—Mr. King, for an improved method of making anvils.—Mr. Holdsworth, for a new method of constructing roofs.—Mr. Perkins, for his simple and efficacious mode of heating workshops, &c. and for driving off the black water of water-mills.—Mr. Ainger, for an improved latch.—Mr. Bullock, for a ball cock.—Mr. Elliot, for a safe coach.—Mr. Skinner, for a chimney sweeping brush.—Mr. Trengrouse for a method of rescuing the crew in case of shipwreck.—Mr. Jennings, for a log glass.—Mr. Jameson, for a marine thermometer.—Mr. Stokes, for a hydrometer.—Mr. Hardy, for a clock escapement.—Mr. Prior, for the striking part of a clock.—Mr. Gorman, for a truss.—Dr. Maxwell, for a hook to extract pins from the gullet.

In Agriculture.

The Duke of Devonshire, for planting forest trees.—Joseph Ridgeway, Esq. for improving waste land.

In Colonies and Trade.

Dr. Hibbert, for the discovery of chromate of iron in the Shetland Isles.—Mr. Redman, for the discovery of a British Stone, applicable to lithographic engraving.—Mr. Donovan, for the curing of British herrings.

In Architecture.

Three designs for the erection of a Grand National Museum, have been approved, and honorary rewards adjudged to Mr. Rich. Kelsey, Mr. Edward Jones, and Mr. Edward Taylor.

In the Polite Arts,

More than fifty specimens, the productions of juvenile artists, have been approved, and suitable honorary rewards adjudged to each; among which are several pen and ink drawings in imitation of engraving, which bespeak considerable talent: some tolerable copies of Rembrant, and other old masters, with original landscapes, flowers, fruits, &c. in oil and water colours, principally from the pencils of young ladies; and also some specimens of modelling, which do great credit to their rising genius.

New Society of Civil Engineers.

An institution has been formed for the purpose of facilitating the acquirement of practical knowledge in the profession of a civil engineer, and for promoting the study of mechanical philosophy.

At a meeting held on the 3rd of February, in Buckingham Street, Strand, *Thomas Telford, Esq.* was chosen president; the whole of the officers are, however, not yet appointed.

The leading objects of the Institution are to form a depository of such useful facts, of descriptions of various works, of new inventions, of discoveries, &c.; and also to collect a library of such books, plans, &c. as may be useful to the profession of a civil engineer.

A considerable accession of members has since taken place, and several valuable papers have been read before the Society, the future progress of which we shall not fail to notice.

Astronomical Society.

This Society is now completely organized. Its meetings are held, till further notice, at the house of the Geological Society, No. 20, Bedford Street, Covent Garden. The ordinary meetings during the present year, are March 10th, April 14th, May 12th, June 9th, November 10th, December 8th, January 12th, 1821, and February 9th, the *anniversary.* The Duke of SOMERSET is President: the Vice-Presidents are H. T. COLEBROOK, Esq. S. GROOMBRIDGE, Esq.; Sir W. HERSCHEL; and J. POND, Esq. *astronomer royal.* The objects of this Society are to encourage and promote the science by every means in their power, but especially by collecting, reducing and publishing useful observations and tables—by setting on foot a minute and systematic examination of the heavens—by encouraging a general spirit of enquiry in practical astronomy—by establishing communications with foreign observers—by circulating notices of all remarkable phenomena about to happen, and of discoveries as they arise—by comparing the merits of different artists eminent in the construction of astronomical instruments—by proposing prizes for the improvement of particular departments, and bestowing medals and rewards on successful research in all—and, finally, by acting as far as possible in concert with every institution, both in England and abroad, whose objects have any thing in common with their own; but avoiding all interference with the objects and interests of established scientific bodies.

Royal Institution.

During the current month this establishment has evinced the utmost activity: Mr. CAMPBELL concluded his course of lectures on poetry; Mr. SOANE commenced his course on architecture; Sir J. SMITH lectured on Botany; Mr. MILLINGTON on astronomy; Dr. CROTCH on music, and Mr. BRANDE on chemistry.

Peach Tree produced from the Seed of the Almond.

Mr. T. A. KNIGHT, has, in the Transactions of the Horticultural Society, described a peach which was the offspring of a sweet almond, and of the pollen only of a peach. The tree produced eight peaches, three of which cleft open like almonds, when nearly ripe, whilst the others retained the form and character of peaches, and the flesh of all was perfectly soft and melting. One of these measured eight inches in circumference; and as the tree grew in a pot which did not contain a square foot of mould, and as the first fruit of every seedling tree is less than its subsequent produce, Mr. K. imagines that the future fruit of this variety will much exceed the bulk indicated by the present sample. Mr. K. had long before entertained an opinion that the common almond and the peach tree, constituted a single species, and that the almond might, by proper culture, through successive generations, be ultimately converted into a peach.

Anatomical Preparations.

It has been usual to employ, for the purpose of preserving anatomical preparations, a spirit of wine above proof, or sometimes highly rectified. Mr. W. Cooke, (Tran. Society of Arts, Vol. XXXIII.) has found that a saturated solution of muriate of soda, or common salt, answers the purpose equally well. The specimens intended for preservation are to be macerated in water, frequently changed, to deprive them of the colouring part of the blood, which usually occupies three or four, or more days, if the substance be large; they are then to be placed in a solution of salt kept in a common receptacle, to saturate them with the salt; and as the water, suspended in the animal structure, would reduce the strength of the solution, this is counteracted by placing in it a linen bag filled with the muriate. It is kept in a linen bag to prevent the foreign matters of the salt from soiling the preparations. At the expiration of a few days, they may be transformed from this vessel into that bottle or solution which is to contain them permanently; or they may remain in the intermediate vessel as long as convenience may require. The solution in which they are finally to be kept, should be a very little below saturation. Every gallon of water dissolves about three pounds of salt. Evaporation is much less liable to happen than when spirit is employed. Should it occur, from any accident, crystallization would result; it is best, therefore, to add about half an ounce of very clear water to a quart of the saturated solution.

On the Retrograde Variation of the Compass.

Col. Beaufoy has, in *Thomson's Annals of Philosophy,* given a table of the variation of the compass for the last three years, viz. 1817, 1818, and 1819. The communication is dated from Bushy Heath, Stanmore, where we presume the observations were made. On examining this general table, it appears, that during the first nine months of the second year's observation, the variation increased; fluctuated during the month of January, 1819; decreased in February, and again fluctuated in March of the same year, since which period, the corresponding mean monthly variation has continually decreased; which circumstance induces the conclusion that the maximum of the western declination of the compass occurred about the month of March, 1819. In the year 1657 the compass had no variation, or pointed to the north; consequently the lapse of time between the magnetic needle being at Zero, and its arrival at its greatest western boundary, is 162 years. It is recorded that in 1680 the declination of the needle was 11, 15 E.; but, as it is not stated whether this was its greatest excess, the discovery of the maximum of eastern variation must be left to the assiduity of future observers.

The Mean Variations of each Twelve Months' Observations, by Col. **Beaufoy**, are as follow:

1817.	Morn.	24°32′28″	1818.	Morn.	24°34′45″	1819.	Morn.	24°32′36″
	Noon.	24 41 14		Noon.	24 43 21		Noon.	24 40 23
	Even.	24 34 46		Even.	24 37 29		Even.	24 34 30

Iron Boat.

A passage boat of malleable iron, now plies on the Forth and Clyde Canal. It is called the Vulcan, and succeeds to admiration. The length is 63 feet; beam

13 feet; depth 5 feet; draught of water when launched 22 inches abaft, and 19 inches forward; when fitted with cabins, &c. 37 and 25 inches; when laden with 200 passengers and their baggage, under 48 inches on an even keel. The weight of iron employed, was 12 tons, 11¾ cwt; which is less than a wooden vessel of the same dimensions. The iron is of the kind called *scrap*.

Coal Gas.

Mr. Clegg has contrived a new apparatus, by which he can produce 25,000 cubic feet of coal gas from one chaldron of Newcastle Wall's End coal, without generating either tar or ammoniacal liquor, being 13,000 cubic feet more than is commonly produced. The coal is introduced into the retorts by mechanical process in strata, not exceeding half an inch in thickness. In this way the retorts are kept at a uniform heat, and the coal is completely and rapidly decomposed; so that the whole of the hydrogen combines with the charcoal, forming olefiant gas; and the matter which is usually in the form of tar or ammoniacal liquor, is also perfectly decomposed. The expense of the new process is also said to be much less than that in common use.

Black Lead.

It appears by a paper of Mr. Otley, in the third volume of the Transactions of the Philosophical Society of Manchester, that the black lead mine in Borrowdale, Cumberland, lies in a greywacke mountain near the head of the valley. That it does not constitute a vein, but occurs in *bellies*. The time of its discovery is not known, but it was previously to the commencement of the 17th century. It used formerly to be wrought at irregular intervals, and when the market was supplied the working was stopped till a fresh demand called for a new supply. Lately, however, the demand has increased so much, that it has been necessary to work the mine without intermission. At an adit opened in 1798, a house is built where the overseer dwells, and the workmen are undressed and examined as they pass to and from work. From a belly opened in 1803, 500 casks of the best quality, weighing about one hundred and a quarter each, besides a greater quantity of an inferior sort were procured. Since that time, two of these bellies have been met with, which produced about 100 casks each. The whole is sent to London, where it is exposed to sale in the Company's Warehouse on the first Monday of every month. One half of this mine belongs to A. Banks, Esq. M, P. and the other half is subdivided into several shares, one of which belongs to Sir Joseph Banks. The great consumption of black lead, is in the manufactory of black lead pencils, and in the shape of powder for polishing grates, &c. Many pencils are made at Keswick ; but the makers are obliged to obtain all the black lead from London. Great improvements have been introduced into the manufacture of those pencils: a method of hardening the black lead has been discovered; it consists in reducing the black lead into slices about $\frac{1}{10}$th of an inch in thickness, and then keeping it for some time in melted sulphur.

Sword of Meteoric Iron.

In the year 1814, Mr. Sowerby had a sword blade hammered out of a slice of nieoliferous iron, (supposed to be of the same meteoric origin as many other stones which have fallen from the atmosphere,) found about 200 miles within the Cape of Good Hope, by Captain Barrow. It was hammered at a red heat without admixture, out of a single piece of this iron an inch thick, ground and polished. Its spring was given it by hammering when cold. The haft was lengthened by welding on a small piece of steel. It was found to work very pleasantly; the whole operation took about ten hours. The mounting and engraving occupied the two following days. No sword was ever completed from the crude material in so short a time. It is in length two feet, and sharpened at both edges, its width 1 inch ⅛ths: the surface is not quite free from blemish, in consequence of the spreading of some minute blows in the material, but they are only superficial, and will serve to distinguish this blade from any imitation that might be made of it. Besides various devices engraved on it, is the following inscription. "*This iron having fallen from the Heavens, was, upon his visit to England, presented to his Majesty Alexander, Emperor of all the Russias, who has successfully joined in battle to spread the blessings of peace through Europe, by James Sowerby, F. L. S. G. S. Honorary Member of the Physical Society of Gottingen, &c. June,* 1814." On the other side, "*Pure meteoric iron found near the Cape of Good Hope.*" The iron of this sword, on analysis, has been found to contain about 10 per cent. of nickel. It was not, from accidental circumstances, presented to the Emperor of Russia whilst in England, as the inscription imparts, but it has since been presented at St. Petersburgh, and received by the Emperor with handsome acknowledgments.

Consumption of Smoke.

It appears, on a motion made by Mr. M. A. TAYLOR, in the House of Commons at the commencement of the present session of Parliament, for the revival of a committee to inquire how far it is practicable for persons using steam engines, &c. to consume their own smoke, that Mr. Parkes, of Warwick, has invented a method, which completely consumes the smoke produced by the furnaces in his manufactory; that only two thirds of the fuel formerly employed are now necessary; and upon entering the premises, any person not acquainted with them, would find it very difficult to discover the situation of the furnaces. A trial of this Invention has since been made in London at the Brewery of Messrs. Barclay and Co. and it completely succeeded, to the satisfaction of the proprietors, and many distinguished persons who witnessed the experiment.

Geography.

The advances made in the interesting science of Geography during the present century, by enterprising voyagers and travellers, aided by the munificence of European governments, and chiefly by that of our own country, have been not only various, but great. No new continent has, it is true, been added to our knowledge, but the continents of both the old and the new world have been explored with a degree of activity and research almost unprecedented. From the *Frozen Ocean* to *Australasia*, the Atlantic, the Indian and the great Pacific Oceans, Africa, the Americas, Asia and Australasia have been traversed in such various directions, that new lights have broken in upon us from almost every quarter. The centre of Africa, that mysterious, because unknown region, will soon, we hope, be completely unfolded to us, and be delineated in our maps, by more correct hands than those of busy conjecture. A desideratum in this science is now in course of publication. We allude to a *comprehensive System of Geography, by* THOMAS MYERS, M. A. *of the Royal Military Academy, Woolwich*, in quarto, two parts of which have already appeared. This work is printed on fine wove paper, a bold and elegant type, and is to be completed in twenty-four parts, forming two large and splendid volumes, accompanied with numerous maps, and many other plates of views, &c. and will include the whole of the latest political arrangements, as well as the most recent discoveries. The specimens already published, augur well for the progress and completion of this undertaking; and the name of MYERS is a guarantee that the public will not be disappointed.

New Yellow Dye.

M. Braconnot has lately applied realgar, or the sulphuret of arsenic, as a dye to various materials, and from the success which he has met with, there seems little doubt but it will soon become valuable to dyers. It is made thus: take of sulphur one part; of the white oxide of arsenic, two parts; of common pearl-ash five parts. Let these be fused in a crucible at a heat a little below redness: a yellow mass results, which is to be dissolved in water and filtered. The filtered solution diluted with water, is to be treated with weak sulphuric acid, and will give a fine yellow precipitate. When washed it dissolves with great facility in ammonia, forming a solution at first yellow, but becoming colourless by the addition of ammonia. The wool, silk, cotton or linen, is to be dipped in this solution more or less diluted, according to the colour required, care being taken that no metallic vessels are used. On taking them out again they are at first colourless, but as the ammonia evaporates they become yellow. They are to be exposed to a free access of air on all sides, and then washed and dried. Wool must be left in the liquor until perfectly impregnated with it, and afterwards slightly wrung. Silk, cotton, and flax merely require immersion, and should have the excess of fluid wrung from them. This dye gives all shades of yellow, and is very permanent in air. Alkali and soap injure it, but for taffeta, velvet, &c. it offers many advantages.—*Annales de Chimie.*

FRANCE.

The *steam* brig *Le Voyageur*, which sailed from L'Orient for Senegal on the 18th of October, has arrived safely at the place of its destination, after a voyage of sixteen days. This is the first steam vessel that has sailed from a French port, on a voyage of any length.

A carriage *with sails*, has lately been exhibited at Paris. It appears that this carriage is of English construction; the object of the inventor is to substitute sails for horses. The mechanism is simple, and ingenious. A helm fixed at the hind part of the carriage, serves to guide it, and by the aid of sails fastened on masts, it receives the power necessary for impelling it forward. It is said that in favourable weather, a carriage constructed on this plan, is capable of travelling thirty miles an hour.

The *Royal Academy of Sciences*, held a public sitting on the 27th of March. The following documents were read: An Essay on the Progress of the Arts and Sciences, relative to Naval Affairs since the Peace, by M. Dupin; on the Influence of Moral and Physical Agents on Courage; a Medical and Anecdotical Notice, by Baron Percy; a Historical Eloge on M. Palisot, Baron of Beauvois, by Baron Cuiver.

The following is a list of the principal prizes proposed for ensuing competitions:—

A grand statistical prize, to be awarded in March, 1821, of a gold medal, worth 1000 francs.

A mathematical prize, for the best Memoir or work on pure or practical mathematics, which shall appear or be communicated to the Academy during the space of two years, the time allotted for the competition, a gold medal, value 3000 francs, to be awarded in March, 1822.

A prize to the author of a work which shall have contributed most essentially to the advancement of experimental physiology, to be awarded in March, 1821, consisting of a gold medal, value 440 francs.

A prize of 500 francs, to be awarded in March, 1821, to the best invention or improvement of the instruments useful in agriculture, the mechanical arts, and the practical and speculative sciences.

New Vegetable Alkalis.

The discovery of the alkaline properties of *Morphia*, has excited the attention of chemists to other vegetable substances, capable of neutralizing acids, and hence it is presumed possessed of alkaline properties. M. M. Pelletier and Caventon, have particularly distinguished themselves in their researches. In addition to *Vauqueline* and *strychnine*, another has been lately discovered, to which the name of *brucine* has been given, from Mr. Bruce, the Abyssinian traveller, having first made known the tree, the false angustura, or *brucea antidyserterlcus*, from the bark of which, the new alkaline substance is obtained. The crystals of brucine, when obtained by slow evaporation, are oblique prisms, the bases of which are parallelograms. When deposited from a saturated solution in boiling water by cooling, it is in bulky plates, somewhat similar to boracic acid in appearance. When in this state, the water may be forced out of it by compression. It is soluble in 500 times its weight of boiling water, and 850 times its weight of cold water. Its taste is exceedingly bitter and acrid, and continues long in the mouth. Given in doses of a few grains, it is poisonous, and acts upon animals in the same way as strychnine. It is not altered by exposure to air; it may be melted by heat at a little above 212, without decomposition, and thus appears like wax. When exposed to a strong heat it is decomposed. It combines with the acids, and forms neutral and bisalts. All these salts easily crystallize.

Delphine is another of these alkaline salts, obtained by M. M. Laisseigne and Fenuelle, from the seeds of staves acre, *Delphinum staphisagria.* The seeds deprived of their husks and rinds, are boiled in a small quantity of distilled water; then pressed in a cloth, and the decoction filtered and then boiled for a few minutes with pure magnesia; it must then be refiltered, and the residuum left on the filter: when well washed, it is boiled with highly rectified alcohol, which dissolves the alkali, and by evaporation, it is obtained as a white pulverulent substance, presenting a few crystalline points. It dissolves in small quantity in water, but very readily in alcohol. With the acids it forms neutral salts, which are very soluble. The qualities of this substance yet remain to be examined.

BARON CAGNIARD DE LA TOUR has constructed an instrument which he calls a *Sirene,* to measure the vibrations of air which constitute sound. The instrument is a circular copper box about four inches diameter. Its upper surface is pierced by 100 oblique apertures, each a quarter of a line in width, and two lines long: on the centre of this surface is an axle upon which the circular plate turns; this plate has also 100 apertures, corresponding to those below, and with an equal obliquity, but in an opposite direction. The obliquity is not necessary to the production of the sounds, but it serves to give motion to the plate by the currents of air. The box is by a tube connected with the bellows that supply the air. The wind of a pair of bellows is made to issue through a small orifice covered by the circular plate. When this plate is made to revolve, which may be effected by the current of air, or by proper mechanism, the aperture is alternately open and shut to the passage of the air; and thus a series of blows are given to the external air, and sounds analogous to the human voice, are produced more or less acute, according to the velocity with which the plate revolves. In the experiments to ascertain the vibrations of each sound, the plate was made to revolve by wheel-work by a weight. The bellows were then used, only for the purpose of judging whether the sound of the machine accorded with the rules of a standard instrument, the harmonica, consisting of an arrangement of steel bars, made to vibrate by a bow. Thus arranged, the machine was made to produce the diatonic notes of the gamut, and some beyond them. The revolutions of the plate were ascertained by the revolutions of the wheel, which made one revolution, while the plate made thirteen and a half. If water is passed through the

Sirene instead of air, sound is equally produced, even where it is entirely immured in the fluid. From this property of being sonorous in water, the Baron gives it the name of Sirene.

Antidote for Vegetable Poisons. M. Drapiez has ascertained by numerous experiments, that the fruit of the *fewillea cordifolia* is a powerful antidote against vegetable poisons. He poisoned dogs with the *rhus toxicodendron*, *hemlock*, and *nux vomica.* All those left to the effects of the poison, died; but those to whom the fruit of the *fewillea cordifolia* was administered recovered completely, after a short illness. He slightly wounded two young cats with arrows, dipped in the juice of *manchenille.* To one of these he applied a poultice, composed of the *fewillea cordifolia*, while the other was left without any application. The former suffered no other inconvenience except from the wound, which speedily healed; the other fell into convulsions and died.

GERMANY.

Dr. C. G. Gmelin, of Tubingen, has, upon an accurate analysis of Petalite found its constituents as follow:

Silica - -	74·17
Alumina - -	17·41
Lithia - -	5·16
Lime - -	0·32
Moisture - -	2·17
	99·23
Loss - - -	0·77
	100·00

By the experiments of the same chemist, we learn that the salts of *Lithia* have many properties in common with the salts of soda. Like them, they are neither precipitated by muriate of platinum, nor by tartaric acid. They may, however, be distinguished from the salts of soda by the following properties: when their concentrated solutions are mixed with a concentrated solution of carbonate of soda, a precipitate falls. They are likewise precipitated by phosphate of soda, and phosphate of ammonia, when no uncombined acid is present.

EGYPT.

M. CAILLAUD, whose discoveries in Egypt will shortly be published at Paris, found near Mount Zabarah, the famous *emerald* mines, which were previously known only by the writings of ancient authors and the stories of the Arabs. They had been almost forgotten for a long lapse of time, and were totally unproductive to the government of the country. They were discovered by M. Caillaud, nearly in the same state in which they had been left by the engineers of the Ptolemies. He penetrated into a vast number of excavations and subterraneous canals, some of which are so deep that 400 men may work in them at once. In the mines were found cords, levers, tools of various kinds, vases and lamps; the arrangement of the work afforded every facility for studying the ancient process of mining. M. Caillaud himself set about working the mines, and presented six pounds of emeralds to Mahommed Ali Pashaw. M. C. is now again in Egypt, and must, ere this, have made many new and interesting observations.

By intelligence from Egypt so late as the 30th of Jan.

last, we learn that the Canal of Ramanieh, which leads from Cairo to Alexandria, is just finished. The merchants of Alexandria propose giving a grand fete in honour of the completion of this vast enterprize.

New Patents Sealed in 1820.

To Francis Lambert, of Coventry Street, in the parish of St. James, Westminster, for an invention communicated to him by a foreigner residing abroad, being a new method of mounting and producing, and also of removing, preserving, and replacing the figure in weaving gold lace, silver lace, silk lace, worsted lace, cotton lace, thread lace, and other laces, whether made or composed of the aforesaid articles, any or either of them, or a mixture thereof.—Sealed, April 11th.—Four months for Inrolment.

To Henry Constantine Jennings, of Carburton Street, Fitzroy Square, for a Lock or Fastening for general use.—Sealed, April 11th.—Six Months for Inrollment.

To William Hall and William Rostill, of Birmingham, for certain Improvements in the Manufacture of Hafts, Handles, or Hilts for Knives, Forks, Swords, or any other Instruments to which Hafts, Handles or Hilts are necessary, and can be applied whether made of Turtle or Tortoise-Shell, or other suitable Materials, which Inventions or Improvements they believe will be of general benefit and advantage.—Sealed, April 11th.—Six Months for Inrollment.

To Thomas Burr, of Shrewsbury, for certain Improvements in Machinery, for manufacturing Lead and other Metal into Pipes and Sheets.—Sealed, April 11th.—Six Months for Inrolment.

To Edward Coleman, Professor of the Royal Veterinary College, St. Pancras, Middlesex, for a new and improved Form of construction for Shoes for Horses, which Invention he believes will be of general benefit and advantage.—Sealed, April 15th.—Two Months for Inrollment.

To Major Rohde, of Leman Street, Goodman's Fields, County of Middlesex, Sugar Refiner, for a Method of separating or extracting the Molasses or Syrup from Muscavado or other Sugar.—Sealed, April 15th.—Six Months for Inrolment.

To George Lilley, of Brigg, County of Lincoln, Gentleman, and James Bristow Fraser, of Blackburn House, County of Linlithgow, Esq. for certain Improvements in the Application of Machinery to propelling Boats, and other Vessels floating in or upon water, and for attaining other useful purposes, by means of an hydropneumatic Apparatus, acted upon by a Steam Engine, or other adequate power.—Sealed, April 19th.—Six Months for Inrolment.

To Wm. Brunton, of Birmingham, County of Warwick, Engineer, for certain Improvements on, and additions to Fire Grates, which he intends to denominate the Economical Fire Grate.—Sealed, April 19th.—Six Months for Inrolment.

To Thomas Cook, of Brighton, County of Sussex, for an improved Apparatus for the purpose of Cooking, which he designates a Philosophical Cookery.—Sealed, April 29th.—Six Months for Inrollment.

To Thos. Hancock, of Little Pulteney Street, Golden Square, Middlesex, Coach Maker, for a discovery that by the application of a certain Material to certain Articles of Dress, &c. the same may be rendered more Elastic. —Sealed, April 29th.—Six Months for Inrolment.

To John Hague, of Great Pearl Street, Spitalfields, City of London, Engineer, for certain improvements in the method of Heating Hot-houses, Manufactories, and other buildings, and of boiling Liquids.—Sealed, May 9th.—Two months for Inrolment.

To John Ambrose Tickell, of West Bromwich, in the County of Stafford, Gent. for a Cement to be used in aquatic and other Buildings, and Stucco-work, which is produced by the use and application of a Mineral Substance, never before employed in the manufacture thereof.—Sealed, May 9th.—Two months for Inrolment.

To Josiah Parks, of the Borough of Warwick, Worsted Manufacturer, for an improved method of lessening the Consumption of Fuel in Steam Engines and Furnaces in general, and for consuming Smoke—Sealed, May 9th.—Six months for Inrolment.

To Jas. Scott, of Grafton Street, Dublin, Watch Maker, for a new method of combining, adjusting, and applying by machinery certain of the well known mechanical powers, and modifications thereof, where power and velocity are required.—Sealed, May 11th.—Six months for Inrolment.

To John Malam, of Romney Terrace, Horseferry Road, Westminster, Engineer, for certain Improvements on Gas Meters.—Sealed, May 11th.—Six months for Inrolment.

To Jas. Jacks of Camberwell, County of Surry, Gent. and Arthur Aikin, of the Adelphi, Westminster, Esq. for a method or methods of preventing Mildew in sail cloth and other canvas, and in other manufactures made of Vegetable Fibre.—Sealed, May 11th.—Six months for Inrolment.

To Robert Wornum, of Wigmore Street, Cavendish Square, County of Middlesex, Piano Forte Maker, for an improvement on Piano Fortes, and certain other stringed instruments.—Sealed, May 13th.—Two months for Inrolment.

To Samuel Kenrick, of West Bromwich, County of Stafford, Manufacturer, for an improved method of

Tinning Cast Iron Vessels of capacity.—Sealed, May 13th.—Six months for Inrolment.

To Rob. Bill, of Newman Street, Oxford Street, County of Middlesex, Esq. for an improved mode of constructing Beams, Masts, Yards, Bowsprits, and other parts of Ships, Vessels and Craft, used for the purposes of navigation, and of other parts of the rigging of such Ships, Vessels and Craft.—Sealed, May 15th.—Two months for Inrolment.

To Rd. Watts, of Crown Court, Temple Bar, County of Middlesex, Printer, for Improvements in Inking Printing Types, with rollers, and in placing and conveying paper on Types, and in Inking with a roller.—Sealed, May 15th.—Four months for Inrolment.

To John Barton, of Falcon Square, City of London, Engineer, for certain Improvements in propelling and in the construction of Engines and Boilers applicable to propelling and other purposes.—Sealed, May 15th.—Six Months for Inrolment.

To Robert Winch, of Shoe Lane, City of London, Press Maker, for certain Improvements on Machines or Presses chiefly applicable to Printing.—Sealed, May 18th.—Four Months for Inrolment.

To Edward Massey, of Eccleston, in the County of Lancaster, and also of Coventry, Watch Maker, for certain Improvements in the construction of Chronometers and Pocket Watches.—Sealed, May 19th.—Six months for Inrolment.

Errata. In our last Number, page 139, line four from bottom, instead of *Capt. Stokes*, read *Capt. Stack*. In the present Number, page 198, line five from the bottom, for *as* read *has*.

W. SHACKELL, Printer,
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No. IV.

Recent Patents.

To SIR WILLIAM CONGREVE, *Bart. for an Improved Mode of Combining and Inlaying Metals or other Hard Substances applicable to various useful Purposes.*

THE principal intention of Sir W. Congreve in this patent is to produce a peculiar kind of type or plate for the printing of bank notes; he, however, describes his invention as applicable to various other objects. The specification states that the metallic plate, or surface (which is to form the basis) or any other material, such as a variety of stones, or of porcelain, capable of withstanding the heat of melted metal, is to be pierced into any kind of fillagree work or ornamental pattern, at the taste or pleasure of the artist. After which, a metal that will flux at a less temperature than that of the pierced mould, is melted and poured in at the back of the mould or plate, so as to be introduced into all the interstices of the pierced mould or matrix, by which a second type or plate is cast, after the manner of casting stereotype plates, and so that when the face is cleaned off and polished, the most beautiful inlaying or combination of the two metals or substances is produced. Thus, gold or silver may be inlayed in iron or steel, &c. The uses to which these inlayings or combinations may be applied, are stated by the patentee to be various, as they may be adapted to form a vast variety of ornamental works for furniture or other such purpose not necessary to be specified.

It may also be contrived that the two or more substances shall separate after having been thus cast together, and made accurately corresponding to the figure of each other, by forming the edges of the first plate or mould so as to deliver the casting or second plate or type after cooling, and thus form a gage of perfect identity as to form and dimensions when compared with the original.

The patentee farther states that these plates or types, when thus made to be separate, might be also applied to printing in two or more colours, by forming a compound plate, which, after being engraved upon, should take asunder for the purpose of being separately inked with different colours, and their parts again combined for giving in the different colours the impression of the plate to paper, by one operation of the printing press; thus producing, what the patentee considers, a novel description of work, which could only be imitated by the same process; and hence, such process presents great difficulties in the way of the forgery of bank notes or other documents, which it is desirable to protect.

Inrolled, April, 1820.

To Sir William Congreve, Bart. *for certain Improvements in the Manufacture of Bank Note Paper for the prevention of Forgery.*

The object of this patent is to produce a new kind of bank note paper, bearing simple and evident marks of its genuineness, which, though difficult in the manufacture, shall be easily recognizable by people of every condition and capacity. It is capable of various modifications as to appearance, still adhering to the same principle of effect, and mode of manufacture. It possesses the character of smoothness and thinness, united with strength and a peculiar transparent water mark, which cannot be imitated by any of the common modes, made use of by forgers: that is, by pressure, friction, varnish, or indeed, any other means whatever, as its peculiar character can only be produced in the original fabric of the paper.

The quality of the paper in the first instance, is designed to be of the finest kind; for this purpose it is necessary to use the best linen rags, perfectly free from cotton, and to work the same into a pulp, by washing and rubbing instead of cutting, by which the fibres of the pulp will be preserved long and flakey, and the paper rendered elastic and tough; this may be also increased by the addition of vegetable or animal matter, such as gum, isinglass, parchment, or vellum cuttings.

The water-marks which are usually produced by raised wires in the mould, are proposed to be made by thin plates of copper or brass, cut to the desired figure, and placed in the mould instead of the beforementioned wires; the clearness of the water mark may be considerably improved by producing the sheet of paper at two dips, in a vat of thin pulp, immersing the first in water before the second dip is taken, it being found that the paper so produced will be extremely delicate and clear.

It is further proposed to manufacture a paper peculiary calculated for bank notes, and which it is not possible to imitate without having recourse to the same process by which such paper is originally made. This paper is intended to be of three layers or thicknesses of pulp, the middle layer being coloured and enclosed within the two thicknesses of white, made of the finest materials above described.

The coloured pulp is produced by adding to a portion of the fine pulp in another vat, a quantity of mineral dye, or vegetable will answer, if the pulp be made of materials capable of producing a beautiful tint and difficult of imitation.

The method of manufacturing this compound paper, is by the use of two moulds, one plain, the other having any appropriate or desirable water-mark. The first dip is made as thin as possible from the vat of white pulp, in a plain mould, the second dip from a vat of coloured pulp in a mould having the water marks which is couched on to the first; another dip of white, as thin as possible, in the plain mould, is then taken and couched into the second. By these means, the coloured paper, bearing the water-mark device, is inclosed and concealed within the white, and is only seen by being held up to the light. The couchings may be easily effected by means of a frame with hinges.

Or this compound paper may be made by first dipping from the coloured pulp with the water mark mould, then taking a dip from the white pulp, and then a dip from the white pulp in a plain mould, and couching them together. Or it may be produced by three dips taken carefully by a dexterous workman which will produce the thinnest paper, and be performed with the greatest expedition.

The test of security may be further promoted by leaving a margin of the coloured paper beyond the edges of the white, which is easily to be contrived by the maker. Further modifications of the above principle may be exhibited, by placing thin sheet-copper figures in the different moulds, so as to produce a thinness in certain parts of the paper, and when the layers are combined together, various shades, either dark or transparent, will be perceived by tinging one of the layers. Or after one layer of paper is made, it may be stamped or printed upon in the mill, with various colours, which being covered by an exterior layer of pulp, either plain or varied in thickness by water marks, mixing and combining if required with the interior, will produce a transparent effect in the paper which would set all forgeries at defiance.

By this process an infinite variety of tests and patterns may be produced, which in the peculiar article of Banknote paper, would be found of great public convenience and utility.

Inrolled, June, 1820.

To WILLIAM CARTER, *Esq. of Grove Place, Paddington, for certain Improvements in the Manufacture of Measures of Capacity.*

THE improvements herein proposed, consist solely in making vessels (as ale house mugs) of cast iron, and afterwards of covering their whole surface with tin. The patentee considers that the great temptation to steal ale house pots and measures, would be effectually removed by the substitution of cast iron, a metal of much less value than pewter. His object, by the present invention, is to manufacture such pots or measures as are used by publicans, of cast iron, either in metal moulds or sand or loam moulds, the former of which may be cast with their handles on, the latter (which is proposed by the patentee) may be cast without their handles, and after coming out of the sand may be annealed, and then turned in a lathe in order to prepare their surfaces for receiving the coating of tin, or any of the usual mixtures of metal for preventing the iron from oxydation. Handles of various shapes may be afterwards attached by soldering or otherwise.

He declares that his "*invention does not consist in any new treatment of the metals hereinbefore named,*" but simply in "*using these metals in the way and manner described, for the purpose of making more perfect measures of capacity than were ever before known or made use of: for although measures of capacity have been made of sheet or wrought iron, and tinned to prevent oxydation, yet none were ever made of cast iron tinned both inside and outside.*

We think the pots here recommended to publicans and others, may be advantageously brought into use; but we doubt whether the patentee can claim for his suggestion an exclusive patent right.

Inrolled, June, 1820.

To CHARLES WILLIAM FEUILLADE,* *of Mortimer Street, Cavendish Square, London, for an Invention of an Improved Mechanical Apparatus, Instrument, or Machine, intended to be called an Aid Form for the Prevention and Remedy of Deformity, and ill Shape in the Trunk or Body parts of Human Beings.*

THIS apparatus consists of a waist belt, two back or blade straps, and two hooped straps to pass round the arms at the shoulder, all connected together. On the waist belt, about the centre of the back, is a metallic plate, with screws and sliding pieces, by the adjustment of which the angular position of the back or blade straps made of steel, and passing from thence to the shoulder, is fixed. At the top of the back or blade straps, are adjustable joints with screws, which hold and determine the angular position of the shoulder hoops. Within the padding of each shoulder hoop is an iron bent to suit the form of the shoulder. If we understand the patentee correctly, the apparatus, being put upon the deformed person, is then strapped and screwed up in all its parts, so as to draw out the deformity, and restore the body to its proper or correct and natural form.

It does not appear from the specification, what particular description of deformity is intended by this machine to be corrected; neither can we perceive its applicability to any irregularities of form but high and uneven shoulders.

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* In the specification, the patentee states himself, Charles William Feuillade Aubusson, although his description in the patent stands as above.

Inrolled, June, 1820.

To JOHN MOODY, *of Margate, Kent, Gent., for an Inkstand, containing carbonaceous and extractive matter in a dry state, which, with the addition of water only, will supply Ink.*

THIS patent consists of an outer case of an inkstand, to be made of metal of any form, in which is to be placed a vessel of glass or lead, intended to contain the carbonaceous and extractive matter, or dry ink; this vessel is to be fixed by pouring round it, and filling up the case with, a cement made of melted sulphur, mixed with lamp black, or any other colouring substance.

The ingredients of which the dry ink is compounded, consist of half a pound of honey, and the yolk of an egg, with one ounce of extract of logwood, mixed up in a mortar; then half an ounce of strong extract of galls is added, and the whole allowed to remain six days, often stirring the compound; it is then to be strained, filtered, and the aqueous parts evaporated, when three ounces of gum arabic, and one ounce of white sugar candy, in a solution of soft or salt water is to be added, with one ounce of indigo, three ounces of lamp black, and two ounces of decoction of logwood; these are suffered to remain for several days, after which one ounce of dry blue galls, one ounce of indigo, and one ounce of willow charcoal, are to be introduced; the water then is evaporated, and the composition, in the state of paste, put into the glass or leaden ink stand, and covered with cotton soaked in vinegar and salt; to which, we presume, whenever it is required to write with, water must be added; but what are the advantages of this composition, and wherein its novelty consists, we should have been happy to have informed our readers, had the patentee favoured the public by stating them.

Inrolled, February, 1820.

To ASPLEY PELLAT, *jun. of St. Paul's Church Yard, London, for an Invention for incrusting into Glass Vessels and Utensils, white or other coloured, painted, or otherwise Ornamented Figures, Arms, Crests, Cyphers, and any other Ornaments made of Composition Metal, or other suitable Material.*

THE methods proposed by the patentee to effect the above object are somewhat varied according to the kind of article to be manufactured. The first, which is proposed for incrusting of figures or ornaments within glass, (premising that the material of which the figures or ornaments are composed, must be such as will not melt at so low a degree of temperature as glass,) is as follows: A quantity of melted glass is taken from the pot by an ordinary glass-blower's pipe, and wrought into the form of the article intended to be made, after this is effected, the same is rendered red hot in the furnace, and upon being removed while in this red hot state, the figures or ornaments (previously heated to the same temperature,) are placed upon the glass article in such parts as may be desired. When this is done, a sufficient quantity of fluid glass, either white or coloured, is to be poured or dropped with the usual instrument upon the figure or ornament, so as to cover it, and being thus incrusted, the whole must be pressed or rubbed with a suitable instrument, so as to cause the air to be entirely discharged from between the surfaces, and if this is not perfectly effected the article thus wrought is to be again placed in a furnace, and after heating must be further pressed or rubbed until the whole of the rarified air has been expelled, which operation will be of additional advantage in bringing the two surfaces of glass into closer union, as well as producing a clear and lucid appearance in the vicinity of the incrusted figure. It is scarcely necessary to observe, that the glass article thus manufactured must be then submitted to the usual process of the annealing furnace, after which it may be subjected to any of the ordinary operations, as of cutting, grinding, and polishing.

The class of articles thus made, are considered as applicable to jewellery, ornaments, parts of snuff boxes, tea caddies, and a great variety of other fancy articles.

The next method proposed for incrusting of figures or ornaments in solid bodies of glass is applicable to decanter stoppers, door handles, knobs of vases, bell pulls, pillars of candlesticks, columns of clocks, &c. where a strong substance of glass is requisite. The manner of performing which is as follows: a proper quantity of melted glass is gathered upon a glass blower's pipe, which is formed into a hollow vessel, or what glass blowers call a muff, and with a pair of pincers an opening is made at the opposite end of the muff, to that which is attached to the pipe, at which opening the figure or ornament being first sufficiently heated, is to be introduced; the aperture is then closed, and the muff, with its internal ornaments, conveyed to the furnace to be properly heated. While the muff is heating, the rarified air must be discharged from its interior, either by the mouth of the workman, or by a small exhausting pump applied to the mouth of the glass blower's pipe. During this process of extracting the air, it is necessary to warm the article, thus manufacturing, to a degree of heat sufficient for gently fusing the particles of glass surrounding the incrusted figure, so as to bring the whole into that close state of union that the muff becomes one solid body of glass.

The third process applies to decanters, bottles, toilet-work, wine glasses, tumblers, &c. These vessels may be blown or manufactured in the usual manner, and when sufficiently formed for the operation of incrustation, and suited to the shape of the figure to be worked into it, the figure is heated as before described, and placed upon the glass, after which the vessel is heated in the furnace until the figure adheres to the glass. Upon being withdrawn, fluid glass is to be poured upon the figure as before described, and the two surfaces brought into intimate union also by pressure.

When the figures or ornaments are minute, and the vessels to be wrought extremely small, the process above may be more conveniently performed by the use of the glass-blower's lamp.

Thus the patentee is enabled to manufacture a great variety of articles in glass, both ornamental and useful the introduction of which he considers as novel. We believe that some specimens of this kind have been for some length of time sold in Paris and in London; the manufacture has not, however, been practised by English people in this country, to our knowledge, before its introduction by the patentee, who states himself as its *inventor*, not as having "*received it from a foreigner residing abroad.*"

Inrolled, June, 1820.

To WILLIAM BROCKEDON, *Esq. of Poland Street, London, for certain Improvements in Wire Drawing.*

THE novelty introduced and claimed in this patent, consists solely in jewelling the holes through which wire is drawn in its manufacture, and though this may appear simple, it is nevertheless an improvement of no small importance. Numerous are the situations in which wire is required to be uniform in thickness and substance; this desideratum has not been hitherto obtained by the usual process of drawing wire, owing in a great measure to the friction, caused by its passage through the steel holes of the draw-plate, creating a degree of heat which occasionally expands the aperture, and softens the metal. The improvement of the patentee, consists in drilling cylindrical or conical holes through diamonds, sapphires, rubies, chrysolites, or any other hard gems, which are to be mounted in frames and properly placed in the draw-plate for use.

Inrolled, March, 1820.

TO JOHN OLDHAM, *Esq. of Dublin, for further Improvements on his former Patent, dated* 10*th October,* 1817, *for an Improvement or Improvements, in the mode of propelling Ships and Vessels on Seas, Rivers and Canals, by the Agency of Steam.*

THIS invention consists in the adaptation of oars, so peculiarly constructed and disposed on the sides of the vessel, that instead of oscillating in a pendulous manner, and returning through the water edgeways at each alternate swing, as described in the specification of the patent above mentioned, the present improvement produces a continuous revolving motion of the oars, which are, by the following method, feathered as they pass in and out of the water.

Instead of many oars or paddles projecting radiantly from the main axle, as round the periphery of the ordinary paddle wheel, the patentee proposes to apply only two pairs of oars to each end of the revolving shaft; which, indeed, he terms one pair of double headed oars, connected by the rods, or arms of the oar, passing through the ends of the shaft or main axle, by the revolution of which shaft the oars are carried round vertically. By a pair of oars it is to be understood, that he means to place two oars along side of each other, nearly together and parallel, so that, as the shaft which carries them revolves, the end of the two oars both dip into the water at the same time; and by double headed oars are merely meant oars of equal length and with similar ends, projecting in opposite directions from the shaft, so that when one pair of oars are in the water, the other pair (or the reversed ends of the double headed oars) are raised out of the water in a perpendicular direction.

In order to feather these oars, they are made to turn round in their sockets, by means of a bevel spur wheel, placed upon one of them, which is to work into a stationary bevel cog wheel at right angles, through which the main shaft passes, and by means of two other small spur wheels of equal diameter: one upon either oar working into each other they will be turned in opposite directions once, or more times according to the respective number of teeth in the bevel wheels; while the double headed oars perform one vertical revolution.

The action of the whole will now be seen: the main shaft or axle (turned by the agency of steam or any other suitable power) carries round the oars, which, as they enter the water, present their edges, and, after they are immersed, open their broad surfaces as a resistance to the water, still turning as they pass on through the water, the oars will feather and rise edgeways with little or no resistance.

With this mode of working, oars may be adapted to act singly; but in the effect of the twin oars as above described, depends much of the advantage proposed by the patentee. There is a provision for lengthening, or shortening the oars by sliding the broad part up or down upon its rod, or stem; or of displacing the oar altogether. It is scarcely necessary to say that it is the intention of the patentee, to apply these oars on both sides of the vessel at the same time; but it must be observed, that they are to be so placed as to act uniformly and together, otherwise the action of the whole apparatus will be affected, and the progress of the vessel, as well as its easy motion, considerably interrupted. Lastly, as in the foregoing description, only two pairs of oars are proposed to be applied to each end of the working shaft, (or shafts of which there may be two or more) the oars may be set at rest in a horizontal position when they are completely out of the water, by which, whenever it may be advisable to have recourse to sails alone, every impediment to the vessel's sailing is removed.

Inrolled, June, 1820.

To John Baynes, *of Leeds, Yorkshire, for certain Machinery to be applied to Carriages, for giving them motion.*

The patentee observes, that many attempts have been made (particularly within the last few years,) to construct some kind of machinery, by which carriages may be propelled by the rider, without the assistance of horses or any other cattle; the principal failure of which inventions have arisen from attempts made to impel the wheels round, not observing the very great loss of power by having the resisting force upon the carriage, as well as the considerable friction upon the axle, when the power is applied to the wheels. Many trials have been made with cranks; which, however, cannot answer the purpose, as there is no power in a double crank beyond two thirds of its revolution, and hence, if an impetus cannot be applied to carry it over the dead points, the carriage must stop. These difficulties are only surmounted by the agency of a heavy fly wheel, which is altogether inapplicable to a carriage, particularly of a chaise description; and even, if it were possible to surmount this difficulty, the wheels would sometimes, upon hard ground, slide round under the carriage without making any progress.

In the above patent cabriolet, for such is the kind of carriage to which the invention appears to be applicable, the patentee has avoided such objections above stated, by not applying his power to the wheels, they being left free to turn upon their axes by the progress of the carriage. This patent carriage is to be impelled by pressing upon treddles, which are connected to levers, that force the vehicle forward by means of crutches or legs acting against the ground; a part of the weight of the traveller and that of the carriage being made the propelling force.

The above machinery to be attached to carriages is all, except the crutches or legs, concealed within the body, through which the parts are transparently shewn in Plate XII. Fig. 1. whereof *a* and *b* are treddles, having slips or openings for the legs and connecting rods to move in; *c* and *d* are the legs or crutches; *e* and *f* are the rods which support the legs; *g* and *h*, are the double rods, by which the treddles are connected to the legs. The leg *c*, the supporting rod *e*, and the treddle rods *g*, are conjoined together by a pivot at *i*; the leg *d*, the supporting rod *f*, and the treddle rods *h*, are conjoined together at the pivot *k*. The action is effected as follows: press upon the treddle *a*, when the rod *g*, will bring down the pivot *i*, with the leg *c*, the rod *e*, and the rods *g*, into the situation of the dotted lines; the carriage being connected to the leg *c*, by the rod *e*, will, from this action of the leg and rods, be impelled forward; and, at the same time, by the pull of the cord *l*, (which passes through a sheave or pulley block *m*, and connects it at the two ends to the rods *e*, and *f*, and the arms *n*, and *o*,) the leg *d*, the rod *f*, the rod *n*, and the pivot *k*, will be brought up to the situation of *c*, *e*, *g*, and *i*, respectively ready for a stroke of the treddle *b*, which will also impel the carriage forward as above described; and this action being continued, will effect the rapid progressive motion of the carriage even against stones or a hill of considerable elevation.

Inrolled, April, 1820.

To JACOB PERKINS, *late of Philadelphia, &c. for certain Machinery for Eccentric Scroll Engraving, &c. including a Method of Softening and Hardening Plates or Blocks of Steel, applicable to the Production and Multiplication of Bank Notes.*

[*Concluded from page* 171.]

IN Plate XI. is represented an engine lathe, for engraving oval or circular geometrical figures upon metal or other surfaces, whether flat, convex, or concave: fig. 1, is a front view of the lathe.—Fig. 2, is an end view of the same, with the chucks and rest removed. Fig. 3, the opposite end view of the same.

(*a a.*) The bed of the lathe, *b b*, cheeks, or arms fixed in the lathe bed, to support the swinging parts of the lathe, which vibrates upon screws or pivots at *c c*; *d d*, are screws in the cheeks *b b*, to hold the swinging parts steady, when the toothed wheel-work is thrown out of gear, and the lathe is intended to be used as a common lathe; *e*, is the lathe mandrel; *f*, the whorl or pulley; *g*, the main toothed wheel, with its sliding socket, which can be fixed by a screw; *h*, the intermediate and connecting pinions, the arbor of which, acts in the adjusting frame or bracket, *i*, which is united with the swinging frame by a screw and nut; *j*, the upper mandrel, on which the several toothed wheels, *k k*, fixed upon a sliding socket, can be secured; *l*, the whorl or pulley of the upper mandrel; *m*, the collar of the lathe mandrel; *n*, the collar of the upper mandrel; *o*, the oval chuck formed as usual; *p*, the eccentric cylinder, and its moving plate, which is connected with the swinging frame by the adjusting screw and nuts; *q*, the adjusting chuck, to hold the plates, blocks, &c. to be engraved with a plate or block fixed thereto; *r s*, the roller, which slides in an oblong square upon the end of the upper mandrel, and can be moved more or less eccentric, and secured by means of an adjusting screw; *t*, an arm, screwed to a pillar which is fixed upon the bed of the lathe, and from which arm depends two vertical parts which hold a cheek *v*, let into a dove-tailed groove, and an adjusting elastic cheek *u*, which is retained in its place, by steady pins, and between which cheeks the eccentric roller *s*, revolves, and causes the swinging parts of the lathe to vibrate more or less, according to its eccentricity.

The whorl on the upper mandrel, receives motion from a lathe-wheel below, not shown. One of the toothed wheels *k k*, upon that mandrel, works into the larger of the two intermediate pinions *h*, which are fixed upon one arbor, whilst the smaller of those pinions, works in the toothed wheel *g*, fixed upon the lathe mandrel. The turning or engraving tool, not shewn, must be held in a slide rest, with adjustments, as usual in other engine lathes, and which, therefore, need not be described here.

In order to produce a figure upon a flat concave or convex surface with this lathe, let one of the toothed wheels *k*, upon the upper mandrel, having 132 teeth, be connected with the larger of the intermediate wheels *h*, having 58 teeth; and let the smaller of those wheels *h*, having 32 teeth, take into the toothed wheel *g*, of 352 teeth, which is fixed upon the lathe mandrel *e*; and it will be found that four revolutions, and five-sixths of another, will be made by the wheel *k*, to one revolution of the lathe mandrel *e*: consequently, six revolutions of the lathe mandrel *e*, will complete the figure upon the surface of the body to be operated upon; and this, whether the figure be circular or oval, the latter depending upon the eccentricity of the oval chuck.—The intermediate wheels *h*, may be removed, and the largest of the wheels *k*, can be connected with the wheel *g*, and will produce a different figure, which may be also varied by the eccentricity of the cylinder *p*, being made greater or less; as well as by causing other of the toothed wheels and pinions to be connected together; and thus an infinite variety of figures may be produced.

In operating upon convex or concave surfaces, the turning tool, in the slide rest ought to be acted upon, by a spring and regulating gauge, so as to cause it to follow up the varying surfaces.

At figs. 4 and 5, is represented another engine lathe, for engraving certain figures upon the peripheries of metal or other cylinders.—Fig. 4. is a plan of it, with the hand and wheel, and its carriage removed, and part of the wooden frame broken off.—Fig. 5, is a longitudinal section of the same, the front of the carriage being removed to shew the parts more distinctly.

The supporting frame, the foot-wheel, the crank, axis, &c. being common to other lathes, is either not shewn, or not referred to; *a*, the cast iron bed of the lathe; *b b*, two upright metal blocks, firmly secured by screws, to the cast iron bed; *c c c c*, four cylindrical rollers, of equal size, fixed in pairs, upon the two spindles *d d*, which turn upon the conical points of the four adjusting screws, as centres. Upon these four rollers *c c c c*, the vibrating carriage of the lathe *e e e e*, is supported and guided, by means of two short steel bars, which are affixed on the under side of the carriage, and move between four steel bars upon the upper surfaces of the blocks *b b*, two of which bars are fixed and the others are moveable; the motion of the carriage *e e*, is thus secured, in a line parallel to the axis of the mandrel of the lathe. Four steel plates are also fixed on the under side of the carriage, which move upon the tops of the four rollers. The large conical end of the lathe mandrel *f*, works in a steel collar at *g*, secured to one end of the carriage, and its smaller end works in a conical hole, made in the adjusting screw *h*; on the larger end of the mandrel *f*, is a male screw *g*, on which the chucks are fixed; and it has also a pulley or whorl *i*, upon it, which is intended to receive motion occasionally by a band from a foot wheel; it has also a toothed wheel *j*, fixed to a sliding socket with a binding screw upon it, which gives motion to an intermediate pinion, *k*, at right angles to it, which is fixed upon an arbour turning in pivot holes in a bracket *l*, that is secured to the carriage. On the same arbor is likewise attached the toothed wheel *m*; *n*, is an arbor, placed at right angles with the mandrel, having a nick, at one end of it with a shoulder, working in and through a steel collar, which is fixed to the side of the carriage; its other end has a conical hole turning upon the conical point of an adjusting screw as a centre. On the outer end of this arbor *n*, is fixed the pully *o*, which receives motion by means of a band wheel to be supported on a carriage or frame fixed to a lathe bed, but not shewn. On the arbor *n* is attached a sliding socket, having an adjusting screw, and upon which socket are fixed the three toothed wheels *p*; there is likewise fixed upon a square on the arbor *n*, a cylinder *q*, which can be moved eccentric, by means of its adjusting screw, in any situation, between the shoulder of the arbor and the nut *r*, which is screwed upon the end of it: this cylinder *q*, revolves between two steel upright plates *s* and *t*; the first of which *s*, is firmly fixed by screws, to one of the blocks; whilst the latter *n*, is so fixed to it, that its upper part, which is made sufficiently thin to be elastic, can yield a little, so as to prevent the eccentric cylinder from binding or shaking between the plates *s* and *t*.—When the arbor *n*, is turned round, and the cylinder *q*, is concentric with it, the carriage *e*, will remain at rest; but, on the cylinder being made eccentric to the arbor, as shewn at fig. 5. the carriage will vibrate backwards and forwards, upon the four rollers *c c*, double the distance of the eccentricity of the cylinder; and, as the lathe mandrel is carried round at the same time, by means of the train of toothed wheels before described, any cylindrical body screwed upon the end of the mandrel, at *g*, will receive waved lines upon its periphery, from the point of any proper turning tool, fixed in a slide rest, as usual in engine lathes; and, therefore, need not be described here: the waved lines, will vary according as the cylinder *g*, is made more or less eccentric, the difference of the velocity of the mandrel *f*, and arbor *n*, made greater or less, and the diameter of the cylindrical body to be operated upon; or by any one, two or three of these changes being made, together or separately.—Thus, let the middle toothed wheel *p*, of one hundred teeth, upon the arbor *n*, fig. 4, be connected with the intermediate wheel *m*, having one hundred and eighty teeth; and let the pinion *k*, of thirty-two teeth, fixed upon the same arbor as the wheel *m*, be connected with the wheel *j*, of three hundred and fifty-two teeth, fixed upon a lathe mandrel *f*, then the difference of velocity between the toothed wheel *p*, and the lathe mandrel *f*, will be as nineteen and four-fifths to one.—And as a motion backwards and forwards, endways, is given to the mandrel *n*, at every revolution of the arbor *f*, so, consequently, nineteen and four-fifths waved lines, will be made round the periphery of the cylindrical surface, to be operated upon, at each revolution of the mandrel *n*; and, as the last waved line falls short one-fifth at each revolution, it will take five revolutions of the mandrel *n*, for the graving tool to enter again into the first cut waved line; when it would go over the same course again, and deepen the lines, if necessary.

In order to de-carbonate the surfaces of cast steel plates, cylinders, or dies, by which they are rendered much softer, and fit for receiving either transferred or engraved designs, the patentee discovered that pure iron filings, divested of all foreign or extraneous matters, produce the softest de-carbonated surface; and therefore, he proposes the use of iron filings as pure and as free from rust as can be obtained, carefully excluding all carbonaceous matter, and any substance from which carbon can be obtained.

The stratum of de-carbonated steel, should not be too thick for transferring fine and delicate engravings: for instance, not more than three times the depth of the engraving. The surface of the steel may be de-carbonated to any required thickness.

To de-carbonate it to a proper thickness for fine engravings, it is to be exposed for four hours to a white heat, enclosed in a cast-iron box, with a well closed lid. The sides of the cast-iron box, are made at least three quarters of an inch in thickness, and at least a thickness of half an inch of pure iron filings, should cover or surround the cast steel surface to be de-carbonated. The box is to be suffered to cool very slowly, which may be effected, by shutting off all access of air to the furnace, and covering it with a layer, six or eight inches in thickness, of fine cinders. Each side of the steel plate, cylinder or die, must be equally de-carbonated to prevent it from springing or warping in hardening. It is also found that the safest way to heat the plates, cylinders, or dies, is in a vertical position.

The Patentee makes use of good cast steel, in preference to any other sort of steel, for the purpose of making plates, cylinders, circular or other dies, and more especially when such plates, cylinders, or dies are intended to be de-carbonated. For the reason given above, the steel is de-carbonated, solely for the purpose of rendering it sufficiently soft for receiving any impression intended to be made thereon. It is therefore necessary that, after any piece of steel has been de-carbonated, whether it be in the shape of an engraved plate, or a cylinder, or a die with engraved, or other figures upon its surface, in order to receive such figures, &c. it should be again carbonated, or re-converted into steel capable of being hardened. In order, therefore, to effect this carbonization or re-conversion into steel, the following process is employed: a suitable quantity of leather is to be converted into charcoal by the well known method of exposing it to a red heat, in an iron retort for a sufficient length of time, or until all the evaporable matter is driven off from the leather. Having thus prepared the charcoal, it is reduced to a very fine powder; then, take a box made of cast iron of sufficient dimensions to receive the plate, cylinder or die, which is to be reconverted into steel, so as that the intermediate space between the sides of the said box, and the plate, cylinder or die, may be about one inch. This box is to be filled with the powdered charcoal, and having covered it with a well fitted lid, let it be placed in a furnace similar to those used for melting brass, when the heat must be gradually increased until the box is somewhat above a red heat; it must be suffered to remain in that state, till all the evaporable matter is driven off from the charcoal. Then remove the lid from the box, and immerse the plate, cylinder or die in the powdered charcoal, taking care to place it as nearly in the middle as possible, so that it may be surrounded on all sides by a stratum of the powder of nearly an uniform thickness. The lid being replaced, the box with the plate, cylinder, or die, must remain in the degree of heat before described for from three to five hours, according to the thickness of the plate, cylinder or die, so exposed. Three hours are sufficient for a plate of half an inch in thickness, and five hours when the steel is one inch and a half in thickness. After the plate, cylinder, or die, has been thus exposed to the fire for a sufficient length of time, take it out from the box, and immediately plunge it into cold water. It is important here to observe, that it is found by experience that the plates or other pieces of steel, when plunged into cold water, are least liable to be warped or bent, when they are held in a vertical position, or made to enter the water in the direction of their length. If a piece of steel, heated to a proper degree for hardening, be plunged into water and suffered to remain there until it becomes cold, it is found by experience to be very liable to crack or break, and in many cases it would be found to be too hard, for the operations it was intended to perform. If the steel cracks or breaks it is spoiled. In order to render it fit for use, (if by accident it becomes too hard,) should it happen not to be broken in the hardening, it is the common practice to heat the steel again, in order to reduce or lower its temper, as it is technically called. The degree of heat to which the steel is now exposed, determines the future degree of hardness, or the temper, and this is indicated by a change of colour upon the surface of the steel. During this heating, a succession of shades is produced from a very pale straw colour to a deep blue. It is found, however, by long experience that, (on plunging the heated steel into cold water, and suffering it to remain there no longer than is sufficient for lowering the temperature of the steel to the same degree as that to which a hard piece of steel must have been raised, in order to temper it in the common way,) it not only produces the same degree of hardness in the steel, but what is of much more importance, almost entirely does away the risk or liability of its cracking or breaking. It is impossible to communicate by words, or to describe the criterion by which, we can judge of, or determine, when the steel has arrived at the proper degree of temperature, after being plunged into cold water; it can only be learned by actual observation, as the workman must be guided entirely by the kind of hissing or singing noise, which the heated steel produces in the water while cooling. From the moment of its being first plunged into the water a varying sound will be observed; and it is at a certain tone before the noise ceases, that the effect to be produced is known. The only directions which can be given, whereby the experimentalist can be benefited, are as follow: namely, to take a piece of steel which has already been hardened by remaining in the water till cold, and, by the common method of again heating it, to let it be brought to the colour which would indicate the desired temper of the steel plate to be hardened by the above process; as soon as he discovers the colour to be that of pale yellow, or straw colour, to dip the steel into water, and attend carefully to the hissing, or as some call it, singing noise, which it occasions; he will then be better able, and with fewer experiments, to judge of the precise time at which it should be taken out. It is not meant to be understood that the temper indicated by a straw colour, is that to which the steel plate, cylinder, or die, should be reduced, because it would then be found too hard; but merely that the temperature which would produce that colour, is that by which the peculiar sound would be occasioned, when the steel should be withdrawn from the water for the first time. Immediately on withdrawing it from the water, the steel plate, cylinder, or die, must be laid upon or held over a fire and heated uniformly, until its temperature is raised to that degree, at which tallow would be decomposed; or, in other words, until smoke is perceived to arise from the surface of the steel plate, cylinder, or die, after having been rubbed with tallow. The steel plate, cylinder, or die, must then be again plunged into water, and kept there until the sound becomes somewhat weaker than before. It is then to be taken out and heated a second time to the same degree, and by the same rule of smoking tallow as before, and the third time plunged into water, till the sound becomes again weaker than the last. Expose it a third time to the fire as before, and for the last time return it into the water and cool it; after it is cooled, clean the surface of the steel plate, cylinder, or die; and by heating it over the fire, the temper must be reduced by bringing on a brown, or such other lighter or darker shade of colour, as may best suit the quality of the steel, or the purpose to which it is to be applied.

Although a particular description of the process employed for hardening or tempering steel plates, cylinders, or dies, is set forth in the specification, and the patentee believes the major part of the process to be new, yet he does not claim any of the privileges granted to him in the patent, for the exclusive use of the said process, but freely gives it to the public for their use and benefit, in every branch of manufacture except that for which his Patent is taken, viz. Dies and Bank Note Plates.

Inrolled, April, 1820.

To JOHN AMBROSE TICKELL, *of West Bromwich, in the County of Stafford; Gent. for a Cement to be used in Aquatic and other Buildings, and Stucco work, which is produced by the use and application of a Mineral Substance, never before employed in the manufacture thereof.*

THE material herein proposed is a certain matrix of Iron Ore, which is to be found in the neighbourhood of coal minds and iron mines. It contains a small portion of iron united with argillaceous and calcareous matter, but is considered too poor for smelting, and has, therefore, been hitherto discarded as refuse and useless. Its appearance is of a blueish gray colour, and its primitive form or crystallization, the figure of an inverted cone slightly concave on the sides.

The stone is to be calcined and broken into small pieces, after which they are to be calcined again, and ground between mill stones, when they are fit for use. Great quantities of this substance are to be found in the vicinity of iron and coal, but as it is not mentioned by any technical name in the specification, we presume the characteristic above described will be sufficient for its identification.

Inrolled, July, 1820.

To LIEUT. WILLIAM ROGERS, *R. N. for a Substitute for an Anchor, which he intends to denominate a Block Anchor.*

THE novelty of this invention as a mooring block, or block anchor, consists in its peculiar form and construction as represented in Plate XII. fig. 2. *a*, is the block; *b*, the shank which is moveable in the centre of the block upon the axis *c*, passing through the block lengthways, and through the eye of the shank as seen by dotted lines.

The block has the angle of both sides *d*, *d*, alike; so that in whatever situation it reaches the ground, it will of necessity fall into a position by which its edge *e*, meets the ground.

The peculiar advantages of this contrivance over the anchor hitherto used, will be evident by the following explanation. Supposing ground upon which it is desired to anchor be peculiarly hard, the block, on reaching it, will assume the position shewn in the figure, with the point of the shank either to the left or the right, accordding to the direction of the ship. The lower point or bill of the shank being as sharp as the bill of an ordinary anchor, will immediately penetrate into the ground, partly by its own weight, and partly by the weight of the block, the edges of the block being likewise brought in contact with the ground.

As soon as the vessel begins to drag, the bill of the shank *f*, and the edge *e*, of the block, will penetrate and continue so to do, until it has taken a firm hold, and the vessel is brought up.

In soft ground the weight of the block and shank will cause both to enter, before dragging commences; and it will generally bury itself by the time it has been dragged twice its own length.

When used in good anchoring ground, such as clay or mud, the water is excluded from beneath the broad under surface of the block, in consequence of which the cohesion, assisted by the pressure of the atmosphere, and the weight of the superincumbent water, will hold it much more firmly than when used in hard ground or shingles where the upward pressure of the water cannot be removed. But in any case it will hold as much as any anchor of the usual form and of equal weight, with many peculiar advantages.

In the event of a ship going round the block anchor, it would be found that it cannot possibly foul, as is often the case with the common anchor; so that a ship with this improved apparatus, may ride at single anchor with perfect safety.

Or, should the ship pass over it, the shank will disengage itself by rising, when the block will turn on its crown or rounded side, and the shank moving upon the axis *a*, before described, will, as the vessel drags, again penetrate the ground, and of itself take fresh hold, in an opposite direction, which cannot be the case with blocks having the property of holding on one side only; and which require to be carefully lowered to the bottom, in the situation, position, and place, where they are intended to remain stationary. The ordinary block anchor only holds by its own weight, and, if upset, can have no tendency to penetrate the ground unless restored to its proper position; but this improved block anchor is calculated to right itself under all circumstances, an advantage which, together with its compactness, allowing it to be stowed away in a small space as well as its cheapness, being made principally of *cast iron*, the patentee considers will ultimately bring it into general use.

Inrolled, June, 1820.

To JAMES GLENNY, *of St. John's Square, Clerkenwell, and* JOHN DARBY, *of Gee Street, London, for a Machine and Apparatus calculated to answer the purposes of a Fire and Burglary Alarm.*

THE object of this invention is to indicate, by means of a placard or signal, containing the written information, in what part or situation of the premises to which it is attached a Fire or Burglary has taken place, immediately upon either having happened.

This is effected by means of an alarum, placed within a box, having the appearance, if desired, of a book case, the internal works of which are connected by lines to every part of the house or premises that may be thought hazardous. These lines, carried from the alarum in the manner of bell wires, are, at their extremities, connected to triggers, any one of which being discharged, releases its line immediately, and sets off an alarum bell within the box, firing a pistol also if attached thereto, and at the same time, presents a slider or label, containing the words *Fire* or *Thieves* in such a part of the premises, describing where, and which of the two occurrences; the label being previously prepared and attached to the line that runs to the particular part mentioned.

The construction of the apparatus is as follows: A box of any external appearance, placed in the bed room or elsewhere, as a piece of furniture, contains the alarm bell, which is connected to the striking part of a clock. Each of the lines before described are connected at one end to a piece of metal as a trigger, which is hooked to a hold-fast placed in such a situation, that by the opening of a door or window, the trigger is liberated, and the line suffered to recede. The line passes over pullies placed at every angle until it arrives at the box containing the alarm into which it is introduced. At this end of the line within the box is suspended an iron weight, which is let fall by the line running back when it is liberated from the hold-fast.

These iron weights in falling strike down levers, which levers are formed by pins fixed in a wooden axis crossing the box, so that any one of the iron weights in falling will cause the wooden axis to turn. At one end of this axis is an arm, connected by a wire to the striking part; by the pull of this wire which takes place when the axis turns, the alarm is set off. At the lower part of each of the iron weights above mentioned (or indeed in any other convenient part or manner) is a chain or other contrivance connected to the label, placard, or direction signal, which, by the fall of the weight, is projected forward or presented to view.

The alarum or striking part is of the ordinary construction, having a spring in the barrel to be wound up as usual.

Thus it will be understood that by the opening of any door, window, or strong box, a trigger attached thereto will be let off, and the line connected to the trigger running back about one foot, will cause the weight at its other extremity to fall as above described, discharging the alarum, and presenting a label, descriptive of the part of the premises from which it leads.

The contrivance above described, is intended to give notice that a burglary has taken place, and in what part. In the event of fire, the same apparatus is adapted to indicate the occurrence, by substituting in place of the trigger and line before mentioned, small lines of cat-gut, or other fit material (connected to the alarum, as above described) which are carried across the ceiling in any direction, or round the cornices of the apartment intended to be guarded. It being considered by the patentee that a flame always ascends, these slender strings would be burnt asunder before the fire could have taken sufficient hold to endanger the premises; and the alarum having, upon the string being burned, instantly given notice of the occurrence, as well as of the precise spot where it has taken place, so early an indication will enable the persons alarmed to extinguish the fire before it has arrived at a serious head.

There is also a contrivance by which an instantaneous light machine may be put in action by the operation of the alarm; but the novelty and improvement claimed by the patentee consists solely in the adaptation of the placard or label, describing where the burglary or fire has taken place; and though several of the modifications of the alarum are the invention of the patentees, yet they do not wish to claim them as exclusively their own, but confine themselves to the use of the indicating label only.*

Inrolled, May, 1820.

To James Henry Lewis, *of High Holborn, London, Professor of Stenography, for an improvement, or substitute for, or addition to, Pens, as usually employed in the art of writing, which he denominates* Calegraphic Fountain Pens.

This invention, is a reservoir pen, which holds a sufficient quantity of ink, to supply the writer for many hours without replenishing. It consists of the barrel of a swan's quill, prepared and rendered soft for the purpose, which is filled with ink, and has a puncture at its smaller end for discharging it to the nib, where also is placed a piece of sponge, in order to lessen the flow of the ink. At the top of the barrel, is a short tube of metal, for the purpose of distending the quill and preserving its cylindrical form, where the reservoir is closed with a cork, by which the ink is retained, and the end is covered by a metallic cap.

Another short metal tube, is placed upon the smaller end of the barrel, for the purpose of holding the nib of the pen, to supply which, the ink from the end of the barrel is forced out by the pressure of the finger and thumb. Several nibs may be together placed upon the tube, so as to enable the writer to remove the one he has used, and proceed without the trouble of stopping to mend his pen.

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* We understand the apparatus is put up complete from £5 upwards.

A conical tube may be attached at the small end of the barrel, to receive a crow pen, if desired, which is supplied with ink as above.

Two pens of the improved construction, may be united together at the larger end of the barrel, by a screwed ferrule, so as to supply red ink at one end, and black at the other.

Inrolled, June, 1820.

The inventor has subsequently adapted to his patent Calegraphic Fountain, an instrument to be attached to the end of the conical tube above mentioned, having five nibs for the purpose of ruling lines, for manuscript music. Upon removing this instrument, with the five nibs from the fountain pen, the small round end of the tube, is designed to make the notes. At the reverse end of the fountain, is a nib, by which the tails of the notes are formed.

To JAMES DICKSON, *of Gilmore Place, Edinburgh, for an Improvement or Improvements in communicating Power to Machinery by Water, Quicksilver, Spirit of Wine, Oil, or Fluid; which Improvement or Improvements are applicable to useful Purposes.*

THIS is an engine, constructed in its various parts, much like the steam engine, but is to be put in action, by the pressure of a column of water, falling from a considerable height, which column is intercepted by the working piston of the engine.

Let a column of water, in its descent through pipes, be introduced to the under side of a piston, working in a cylinder; the piston will be raised, by its pressure upward, to the top of the cylinder. Connected to the piston rod, let there be arms constructed as in a steam engine, to open valves; when the piston has risen, let a valve be opened to admit the column of water into the cylinder, above the piston; and, at the same time, another valve at the bottom of the cylinder be opened into the discharge pipe; the cylinder will be emptied below, and filled again above; the piston must then descend by the pressure of the water downward until the cylinder is full, when the connecting arms will close the last mentioned valves, and open the first, by which the piston will be again raised.

Thus an alternate action is produced, similar to that of the steam engine, the weight of the whole column of water below, as well as above, being considered as the power which moves the piston.

As the closing of the valves would cause a momentary stoppage of the works, and produce a shock, there are two air vessels upon the main pipe and an extra pipe with a piston behind, provided for the purpose of receiving the recoil of the water, and several other parts and appendages not described, which every engineer will understand as necessary to the action of the engine, as also the drum for communicating motion to other machinery; but water pressure engines upon the same principle as this, (excepting slight modifications of the mechanism) have been so long in use, and are so well known, that a more detailed account of this patent is considered unnecessary.

Inrolled, June, 1820.

A provision is made in the title of this patent for working with spirit of wine or oil; but it cannot be supposed that either of these fluids would ever be applied to such a purpose.

To HENRY CONSTANTINE JENNINGS, *of Carburton Street, London, for a new invented Substitute for Pitch.*

THE materials of which this substitute for pitch is composed, are tar, charcoal and stone brimstone.

To about one hundred gallons of rough tar, add from fifteen to thirty bushels of carbonaceous matter, made from the burning of saw-dust, shavings, or other vegetable substance, or, indeed, soot will answer the purpose, taking care that the carbonaceous matter be perfectly dry; with this, incorporate a quantity of crude or stone-sulphur, from seven to fifteen pounds, regulating the proportions according to the fluidity of the tar.

If mineral tar be used, add also to every hundred gallons of tar, (and of other ingredients as above) about two pounds of sulphuric acid, of the highest degree of concentration, proportioning the quantity according to the solidity of the carbonaceous matter.

Boil the composition in a vessel fitted with a dome retort head and condenser, till the ingredients added to the tar are thoroughly dissolved and amalgamated, and the compound or artificial pitch is reduced to the consistency which may be desired.

Inrolled, June, 1820.

To WILLIAM COLLINS, *of George Street, Grosvenor Square, London, for an Invention of some useful Additions to, and Improvements on Carriage-Lamps.*

THE improvement upon carriage-lamps proposed in this patent, consists in a mode of shifting the position or situation of the reflector, by means of which the reflected light from the lamp, might be in an instant thrown out of its usual direction, for the purpose of falling upon some particular object by the road side. This is contrived by mounting the reflector upon a box, which turns upon the nozle, so as to enable it to pass round the lamp or candle horizontally; and by that means to project the reflecting rays of light at any angle, to the direction in which the carriage is proceeding.

To the inner side of the box (which carries the reflector) is attached one end of a helical spring, which is coiled round within, and the other end of it is attached to the nozle or to the frame of the lamp. Upon the box being turned so as to coil up the spring, it will have a tendency to return, but is confined by a string or chain, which passes partly round the box in a grove, and is attached at the other end to an upright spindle situated in the corner of the lamp case.

When the driver of the carriage wishes to change the direction of the reflected light (without moving from his seat) he may turn the spindle last mentioned, by means of a small finger and thumb lever, or button, placed upon its top, on the outside of the lamp case, which, by coiling the string or chain upon the spindle draws the revolving box and reflector before described, to any position.

There is a small catch upon the top of the spindle falling into a ratchet for the purpose of holding the spindle and keeping the reflector in that position which may be desired.

Inrolled, May, 1820.

To Louis Fouche Borel, *of the Haymarket, London, for an Invention called the Moveable and Inodorous Convenience.*

The intention of this apparatus, is to prevent much of the unpleasant effluvia arising from privies caused by evaporation; or, as the patentee states, "*to prevent much of that fermentation which arises from animal excrement, by which mephitic vapours are generated.*" It is considered, that by separating the urine from the soil, and not suffering them to act chemically upon each other, a great portion of the nauseous vapours usually emitted will be prevented from generating. For the accomplishment of this object, the patentee proposes to place, under the seat of the privy, a pipe or channel, conducting into a cask or other vessel, the bottom of which cask is to be occupied by a strainer, so that while the earthy parts of the excrement are retained in the vessel, the aqueous parts will drain off into a tunnel below, which leads down to another cask or vessel for the reception of the urine only.

The intention of the patentee, as it is here seen, is to place two vessels, one under the other, for the purposes above stated; and he further proposes, that they should have handles, and be so attached to ropes or chains, as to render them capable of being drawn up by a windlass or otherwise, whenever full; an operation which he considers may be performed without the trouble and disagreeable circumstances attendant upon the ordinary method of emptying privies or cesspools.

Inrolled, May, 1820.

To FREDERICK MIGUEL VAN HEYTHUSEN, *of Sidmouth Street, St. Pancras, Middlesex, Esq. for a Method of making Portable Machinery or Instruments, to be placed upon a desk or table, and so contrived as to fold or not, into a small compass, made of wood,* *brass or other metal, to support a silken shade, for the purpose of protecting the eyes from a strong light; added to which is a green, blue, or other coloured glass in a frame, and in such a position, that, when placed opposite a window, lamp or candle, it will take off the glare of white paper, by shedding a green or blue or other tinge, dependent upon the colour of the glass reflector, upon a book or paper placed within the bounds of its shadow, so that print, however small, or writing is rendered more plain or legible, by reason of the glare being thus taken off the white paper by day, and particularly by candle light, by this means the eye of the reader or writer will be relieved from injuriously dwelling upon a white surface.*

THIS patent is for the construction of a candle screen, to be made of green or other coloured glass, by fixing a piece of thin plate or crown glass in a frame, and mounting that frame in a stand for the purpose of sliding it higher or lower, and also of placing it at any angle, as a swinging looking-glass. There is likewise, a green silken shade attached to the frame, for the purpose of shutting off the light from the eyes of the reader.

These screens of glass with the silken shade, may be applied also to a pedestal stand, to be raised and lowered at pleasure, by sliding up and down in the pedestal, or otherwise, and having a ball and socket for the purpose of setting the glass at any angle. The modes of mounting may be various, but we presume that the invention consists in the adaptation of green or other coloured glass as above described, for the purpose of a reading shade.

Inrolled, May, 1820.

To JAMES HUGGETT, *of Hailsham, Sussex, for a Machine to be attached to Carriages, as a Substitute for a Drag, to regulate the speed, and to prevent accidents in going down hill or other perilous situations.*

THE machine, or apparatus proposed in this specification, consists of a drag under the carriage, intended to rub against the ground, and by the great friction produced, to impede the progress of the carriage when going down hill, or under any circumstances of danger; such as the horses running away: it is particularly designed for mail or stage coaches.

This drag, which consists of a broad piece of iron, is intended to be lowered, so as to come in contact with the ground, and is worked by the hand of the driver without quitting his seat. Its mode of action is by turning a handle situated near the coach-box; this handle is placed on the top of a perpendicular axle, having a spur wheel at its lower end, and which spur wheel works into a bevel cog-wheel upon the end of a main shaft, passing horizontally along under the perch of the carriage. At the other end of the shaft is a pinion, working into a horizontal inverted crown wheel, situate under the hinder boot. This crown wheel, mounted in a carriage, is attached to an axle with a worm, which, by working into a sliding bar, raises and lowers the drag before mentioned.

The drag itself, is suspended by two arms from the sliding bar, (which is described as ascending and descending, by the revolution of the screw that works into it;) the arms are contrived to act against a spring in the drag, for the purpose of easing the jolts which may take place as the drag slides against the ground; or the arms may be made to slide in sockets, having a worm spring within them to answer the same purpose.

By the handle first described being turned backwards, the drag is drawn up; in this situation it is intended to remain while the carriage is going upon level ground; but when descending a hill, and the use of a drag becomes necessary, the handle is turned so as to bring the drag down to press upon the road.

The same contrivance being applied to waggons may be worked by a short spindle and winch behind the waggon, the spindle having a spur wheel acting in the crown wheel before described, by which the drag is to be raised and lowered.

Inrolled, July, 1820.

To HENRY TRITTON, *Esq. of Battersea, for a new Method of producing Rotatory Motion.*

THE Patentee in his specification declares, that the following statement given under his hand, &c., doth particularly describe and ascertain the nature of his said invention, and the manner in which the same is to be performed.

" My method of producing rotatory motion, consists in the combination of atmospheric pressure, with the action of water on a wheel, by placing the wheel in an outer case, capable of exhaustion, and producing therein a rarefaction of the air by an air pump, or any other known machine, for producing rarefaction or exhaustion of air. The water, after spending its action on the wheel, being thrown out by a pump or pumps worked by the wheel itself, or by any other adequate power."

Inrolled, June, 1820.

The above description being all that the patentee has stated in his specification, we are at a loss to conjecture by what mode he intends to combine the pressure of the atmosphere with the action of water, so as to produce rotatory motion, or by what means water is to be introduced to act upon the wheel within the exhausted box. From the latter sentence of the specification, it would appear, that a perpetual motion was effected; we cannot, however, explain the invention or its uses, farther than in the patentee's own words above recited.

Does he claim the combination of atmospheric pressure with the action of water on a wheel in *vacuo* as a newly discovered principle? If so, without considering its novelty or practicability, in what manner does he propose to put this principle in action? For the *particular mode or modes of applying* existing philosophical principles to useful purposes, must be the subject (if new) of a patent right, not the monopoly of any newly discovered principle of nature, in all its adaptations and modifications, without any explicit method of bringing the discovery into use.

"If the *principle* alone, be the foundation of a patent, it cannot possibly stand:"* for a *principle* cannot be a ground for a patent, because it is the first ground and rule of art and science. "The organization of a machine may be the subject of a patent, but *principles* cannot." "A patent must be for a vendible matter, and not for a principle."† "There can be no patent, for a mere principle; but for a principle so far embodied and connected with corporeal substances, as to be in a condition, to act and produce effect, there may be a patent."*

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* Mr. Justice Buller. *Boulton* v. *Bull.*

† Mr. Justice Heath. The same.

"A patent, since the introduction of a proviso for inrolling a specification, is to be considered in the nature of a bargain or agreement, between the king and the subject, that if the latter will (by means of his specification) put the public in full possession of a beneficial invention, found out or introduced into the kingdom by him, he shall have the exclusive benefit of the said invention for fourteen years. So, that a man to entitle him to the benefit of a patent, must disclose his secret, and specify his invention in such a way, that any other person of ordinary abilities, in that branch of business, may be taught to do the thing, for which the patent is granted."

"But if the specification be in any part materially false or defective, the patent cannot be supported;"† or if a mechanic of ingenuity be required to supply its defects by inventions of his own, not before known, or at least applied to similar purposes as the invention in question, then it is considered in the eye of the law, that the conditions of the proviso are not complied with, and the contract between the king and the patentee is annulled, and the exclusive monopoly of the patent right becomes void accordingly.

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* Sir James Eyre. *Boulton* v. *Bull.*

† Davies's Treatise on Patents, Patent Laws, and Cases, 1816.

Original Communications.

Discovery of the supposed Antarctic Continent.

In the month of February, 1819, the Brig *William, of Blyth*, a South Sea Whaler, W. Smith Master, in sailing from Monte Video towards the Pacific Ocean, upon a course bearing S. by W. in lat. 62° 20′ S. and long. 60° W. discovered land, being upon the meridian of Falkland's Isles near Cape Horn, but ten degrees more to the southward.

The same vessel in June following, attempted again to make this unknown coast, but in lat. 62° 10′ and long 62 to 65 W. found the sea so much incumbered with islands and shoals of ice, as to render the progress of the ship impracticable.

In October, Captain Skirreff of the Andromache Frigate upon the Monte Video station, dispatched the same vessel to survey the newly discovered land, when better success attended the enterprise, and she was enabled to make the point first discovered, which was called after the ship, William's Point, lat. 62° 32′ S. long. 59° 56′ W. The vessel then tacked, and steering toward the N. E. passed six islands, some of them ten or twelve miles in length, being from two to five miles off the main land. Here the soundings were found to be from fifteen to twenty-five fathoms.

A part of the crew went on shore, and took formal possession of the land, in the name and on the behalf of his Britanic Majesty, calling it *New or South Shetland.*

On the meridian of 58° 5′ W. about twenty miles inland, to the southward was seen a very high mountain; but the party had not, at that time, an opportunity of penetrating into the interior. No inhabitants were seen, nor any traces of their existence; and the ground was covered with snow, but the seas contained seals and whales in very great abundance.

The vessel proceeding N. E. made a bold promontory in lat. 51° 58′ S. long. 57° 30′ W. which was called North Foreland, about ninety miles E. N. E. of William's Point. A few miles to the westward of this is a small Bay named Sheriff's Cove.

Perceiving that the continuation of the shore from North Foreland, extended in a south easterly direction, much incumbered with ice to about lat. 63° long 55°. the vessel tacked towards the N. W. and at ten leagues from shore took soundings of 100 fathoms.

Having returned again to William's Point the vessel steered W. S. W. and observed another island, lying four or five miles off the shore, which they called Hoscason's Aim. Here the main land, inclining towards the S. W. formed a large bay or inlet; the mouth of which, between forty and fifty leagues over, the vessel crossed, the land in the midway having disappeared for about fifty miles. The variation of the magnetic needle, in crossing this bay was observed, and found to decline 24° 10′ East.

An exalted point of land which now presented itself, formed the western extremity of the bay; which shooting into the ocean was called Smith's Cape, lat. 62° 50′ S. long. 63° 45′ W. Here the land again receded towards the S. W. and the survey closed.

The discovery of so extensive a tract of land in this part of the world, becomes a matter of considerable interest, even in a geographical point of view alone; and particularly so, after the fruitless researches of Captain Cook in the years 1773, 4 and 5, to discover the South Polar continent, which had generally been believed to exist before that time. It has already supplied several English merchantmen, with cargoes of seal-skins, which animals are said to swarm upon the rocks and shores of the new discovered land; and the whales, we understand, are more abundant in its vicinity, than in any other part of the globe; consequently, as the whale fishery has of late years completely failed in the North Seas, South Shetland must soon become an object of great mercantile importance.

The situation of Sandwich Land, discovered by Captain Cook in 1775, suggests the probability of its connection with New Shetland; and the circumstance of both these places, lying very nearly in the track marked out upon old maps, as the shores of *Terra Incognita Australis*, or the southern unknown land, induces a belief that this is a part of the Antarctic Continent, which was several centuries past said to have been discovered, and generally admitted to have then existed.

It will be remarked, in opposition to this suggestion, that Captain Cook made many attempts to find this land, without success; but the very circumstance of his being stopped by ice, in shoals, islands, and indeed mountains, as he himself expresses it, argue very strongly, that land was not far off; if indeed some of the supposed isles and mountains were not absolutely the land itself, covered with frost and snow: for the same degree of frigidity does not take place in the open seas, of corresponding latitude northwardly; nor can any philosophical reason be given for such a phenomenon, unless it be the presence or vicinity of land.

Having mentioned the depicting of this *Terra Incognita* by old geographers, it will be necessary to state of what date; and as obsolete maps have been generally considered as waste paper and discarded accordingly, it may be as well to refer for example, to a curious large globe made in the reign of Queen Elizabeth, now in high preservation, in the library of the Honourable Society of the Middle Temple, London, upon which this Southern continent is represented. By way of strengthening the argument as to the dependence which may be placed upon even so rude and indefinite a sketch as is there shewn, it will be seen that a tolerable outline of the northern shores of New Holland is there drawn as believed to exist, though its discovery is, subsequently to the production of this globe, ascribed to the Dutch under Endracht 1616, Arnhem 1617, Van Diemen 1618, &c.

A chart of the above discovery, very obligingly communicated by Captain Bowles, through Mr. Faden the King's geographer, would have accompanied this, but that the future and more accurate information to be derived from Captain Basil Hall, (whom Government have sent out with an expedition, for the purpose of a more extensive and particular examination of this new discovered land,) will be much more acceptable than the present partial and imperfect survey of a trading vessel.

To the Editor of the Journal of Arts and Sciences.

Nocturna versate manu, versate diurna.—Hor.

Sir,

Language is the gate of knowledge; he who facilitates the knowledge of language, itself a knowledge of words, is of course leading the way to the knowledge of things;—the only real and important object to which all knowledge ought to tend. Whether a universal language might not be invented or adopted by the whole human race, is a question which will be answered differently according to the views which men have of the probable future progress of knowledge generally. But nothing is more clear than this, that, whilst mankind continue divided by different institutions, and remain in various insulated communities, having different interests, habits, manners, modes of thinking, religions and governments, a universal language, for the every day transactions of life, at least is scarcely to be hoped for or expected. That a universal language, or at least a language so universal as to embrace the continent of Europe might be invented and adopted I entertain no doubt: the language expressed by figures, and the present improved chemical nomenclature, are proofs how much has already been done in this way. As, however, the rays of that master mind which is to prompt us to the use of such language have not yet broken in upon our darkness, we must be content to promote the acquisition of knowledge by the best means which are now in our power. Hence will arise the question, *by what method are languages most easily learnt?*

So much has been said and written on the subject of language, that it might seem almost superfluous to agitate the question. I must, however, be permitted to say, that I do not believe we have yet acquired the easiest mode of learning either the dead or the living languages, and that there is still room for considerable improvement.

It is true, there is a *system* in our universities and in our academies and schools; and even the lowest teacher has a species of routine—but that system or routine is, I fear, from the base to the summit of the building, erected rather with a view to the quantity of money which can be got by it, than to facilitate the acquisition of real grammatical knowledge, and a progress in the important science of words.

Let any person take the *Latin Accidence* up, and almost the first thing which he will find in it is the declension of the *article hic*, as it is called. Now nothing can be more absurd than this. The Latin language has *no* article; and the unlearned reader will not be a little surprised when told that this little word *hic* is neither more nor less than a pronoun answering to the English pronoun *this*. I know it will be said that its declension is taught in order to make the student acquainted with the gender: thus as he proceeds, he is taught that *hæc nubis* is *a* cloud, *hic gradus*, *a* step, &c.! Surely a mode of teaching could scarcely be invented more absurd. Again, we are frequently told in our grammars, that some nouns are *substantives* and some *adjectives*: preposterous! an adjective is no more a noun than a verb is a noun. Then comes the terms *tense* and *mood*, with others which are many of them the most stupid which could be invented. But it is not my intention to go into minute criticism on the terms of grammar. I merely mention them here to shew the present imperfect state of our grammatical books. Such terms notwithstanding are very inimical to the progress of the young student, and it is to be lamented that better are not adopted and brought into general use.

As, however, language is the medium by which our thoughts are commonly expressed, and as a *knowledge of grammar* enables us to convey our thoughts most correctly to others, such knowledge should be acquired by every rational being. In the acquisition of this science, the mere pedant has always mistaken the way: hence it is no uncommon thing, even in the present day to find a person well versed in the learned languages, who knows comparatively little of the structure of his mother tongue, and, in fact, who often writes such latinized English as is frequently unintelligible.

Grammar like other sciences, is best acquired by definitions and classification; and although, perhaps no terms which have been yet invented, do in every instance, convey that meaning which a philosophical investigation of language requires, yet, till better terms are invented, we must, to avoid confusion, content ourselves with those terms, which are in common use.

Besides letters, which are or ought to be, the signs of sounds, we have syllables and words, which are for the most part compound sounds. Words are divided by grammarians, into the following kind: *article*, *noun*, or *substantive*, *adjective*, *pronoun*, *verb*, *participle*, *adverb*, *preposition*, *conjunction*, and *interjection*. The greatest difficulty to all learners of grammar, is the acquisition of that knowledge, which enables them to distinguish these different parts of speech, and therefore care and assiduity ought to be employed to enable the learner so to do, before he proceeds one step further in this study.

We will now, however, suppose that our student has acquired a competent grammatical knowledge of his mother tongue; that he can distinguish and point out, in every sentence, its different members or parts of speech; that he is no longer confounded with *tense*, *mood*, *conjugation*, or *declension*, and that *preterperfect*, *preterpluperfect*, and such wretched words, are completely conquered; then, and *not before*, he may enter on the study of a foreign language, with ease and success.

All European languages, appear to be referable to two orders: those of the south—the Greek, Latin, French, Spanish, Portuguese, Italian, &c. belong to one; those of the north—the German, the Dutch, the Danish, the Norwegian, the Swedish, the Russian we believe, and all the dialects of the British Isles to the other. The *structure* of those of the latter order, is in many respects, very similar to our own; the structure of the languages of the former order, is in many respects very dissimilar. And therefore, *primâ facie*, the Northern languages of Europe, are more easily learnt by an Englishman, than those of the South, the language of France, perhaps, excepted.

It must not be forgotten here, that to *read* any foreign language, is one thing, and to *speak* it is another, very different. To speak a foreign language well, it appears to me, that the assistance of a master, or mixing with people who speak the language, is absolutely necessary; to read it, provided the student be furnished with good grammars, dictionaries, and suitable books, no master is wanted. In studying a language, it is of some importance to acquire as soon as possible, the order in which persons, writing or speaking in the language, most commonly think.

There is not so much discrepancy in this respect, between modern languages and our own; but in the ancient languages, it is so great as to form one of the greatest difficulties in their acquisition, and cannot therefore be too carefully attended to.

Having consigned the pronunciation of a foreign language to a *vivâ voce* teacher, I shall now proceed to shew, how the student should proceed to learn to read it.

In the first place, it is scarcely necessary to observe, that he must have before him, a good grammar, a dictionary of the language, with an English interpretation and the most easy books in the language, with and without translations. Having these before him, the answer to the following questions, to be obtained from the grammar or the dictionary, and pursuing the following method, will soon enable the student with a moderate degree of application, to accomplish his utmost expectations. The *letters* in the language must of course be first understood; and this will be more peculiarly necessary, if they should happen to be a different character from the roman or common letters, with which we are all acquainted.

Are there any *articles*—how are they formed? if any, *learn them by heart.*

How many *genders* are there—by what means are they designated?

How are the *substantives* formed—by adding articles and prepositions, or by altering their terminations? are they known by peculiar terminations, as many are in English, in *ness*, *tion*, *ty*, &c.?

How is the *plural* number formed—is there any difference between the masculine and feminine?

How are the *adjectives* formed—have they peculiar terminations—how are their genders distinguished—do they vary their terminations in the different genders, and the plural; are they usually placed before or after the substantives to which they belong?

How are the degrees of comparison expressed?

Are any of the adjectives irregularly formed? if a few, *learn them by heart.*

What are the cardinal numbers, one, two, three, &c.? *learn them to* 100 *by heart.*

What are the ordinal numbers, first, second, third, &c.? *learn them to* 100 *by heart.*

Are both these declined as adjectives?

How are the *pronouns* formed? As they are not numerous, *learn them by heart.*

Are there any important particles? if any, *learn them by heart.*

How many conjugations of *verbs*—how many tenses—how are they formed?

Are there any irregular verbs—how are they formed? *pay particular attention to them.*

Are there any auxiliary verbs—which are they? *pay particular attention to them.*

How is the verb *to be* formed? *learn it by heart.*

How is the verb *to have* formed? *learn it by heart.*

How is the verb *to will* formed? *learn it by heart.*

How is the verb *to be able* formed? *learn it by heart.*

How is the verb chiefly known, by the first person singular of the present tense, as in the Latin, *amo*, or by the infinitive as in English, *to love?*

Have the verbs in the first person singular present tense, and in the infinitive, uniformity of termination, or do they vary?

Are the *pronouns* expressed separately from the verb in the different persons, as in English, or are they expressed in it by terminations as in Latin?

What are the distinctive terminations of the different tenses in the different moods?

How are the *passive* verbs formed?

How are the active and passive *participles* formed—do they vary their genders as adjectives—does the plural vary from the singular—do they admit the degrees of comparison?

How are the *adverbs* formed—are they known by particular terminations?

Do they admit the degrees of comparison—how are they expressed?

Which are the most common adverbs? *learn them by heart.*

Which are the *prepositions*—do they govern particular cases? *learn them by heart.*

Which are the *conjunctions? learn them by heart.*

Which are the *interjections? learn them by heart.*

It is not meant, that the languages should be studied exactly in the order here laid down, because the conjunctions and prepositions will very soon come into requisition: for I advise the student, not to wait till he has gone systematically through all the questions. The articles, substantives, adjectives, pronouns and verbs, must, however, have much previous attention, and then, with the aid of the prepositions and the conjunctions, the learner should go at once, to reading the language, which will do more for him than all the wearysome rules in the world. *Reading* the language, will impress the mind much more strongly and effectually, than the wretched system of getting every thing *by heart*—which is indeed, a heartless task.

What are the peculiarities in the syntax? *attend to them.*

Will the language admit of a great variety of different positions of the words, without destroying the sense?

Are there many idiomatic phrases or expressions? *some of the most common must be got by heart.*

Is the poetical language different from the prosaic—or are there words and expressions peculiar to poetry?—if so, obtain a list of them, and pay particular attention to them.

Read the grammar throughout often. Consult it on every difficulty. Read over frequently the vocabularies at the end. Unfortunately our Latin and Greek Grammars are not usually furnished with the vocabularies which we find in the grammars of modern languages. This omission is one of the greatest defects in the mode of teaching these languages. Consult a good dictionary continually. Begin as soon as possible to read easy books in the language with and without translations; always remembering by no means to depend upon any translation. *After* you can read the language, will be the time, if you should be so disposed, to become critical in it, *not before.*

The pronunciation of a living language, can scarcely be learned well without a master. But the pronunciation and the knowledge of the language are two distinct acquirements; if both can be acquired together, so much the better. But it will be too often found that a teacher of the pronunciation, is a very bad teacher of language in other respects.

Above all, an essential ingredient in the study of any language, is *application.* By which I mean two or three hours a day divided into portions of one hour at a time, and so continued for four or six months. Besides which, the reflective impressions arising in the mind, when not immediately engaged in the study of the language, should be encouraged. In a word according to my motto

Read it by day, and meditate by night.

JAMES JENNINGS.

London, July 15, 1820.

P. S. The questions relative to language, may be, no doubt, greatly multiplied; every intelligent person from these outlines will be enabled to do so for himself: it is sufficient for my purpose, that I have pointed out the way, which as far as I know, has not been done by any person before. A M. DUFIEF has, I am informed, published a work, on language, which he calls *Nature displayed;* this work I have not had an opportunity of consulting, but it is I think in two volumes: whatever be its merits, its voluminousness is a great objection.

I should not be disposed to call my plan of learning languages, nature displayed, but it will be found to approach the nearest to the method in which we learn our mother tongue of any method hitherto adopted in learning languages, when access cannot be had to living example and efficient practice; and the nearer we can approach to this method the better: for the way in which we acquire our mother tongue, is the least irksome to the mind, the simplest and the best.

Novel Inventions.

A new Method of forming Crucibles by MR. CAMERON.*

THE Dutch having long enjoyed an almost exclusive monopoly, in the manufacture of the small melting-pot or clay crucible, used by the jeweller and silver-smith; and the English potter having failed in imitating those imported from Holland, Mr. CHARLES CAMERON of Glasgow, was led about two years ago, to attempt the formation of crucibles similar to the Dutch, by a simple method, namely, that of moulds made of sulphate of lime or stucco, which would easily give any required form.

For each of the different size crucibles, he formed ten or twelve dozen of moulds of stucco, burnt and powdered in the usual manner. For the first mould of each size, he formed a piece of soft pipe-clay, into the shape of the intended crucible, and laid it with its mouth downwards on a flat surface, and inclosed it with a cylinder of white iron, distant about half an inch from the angular points of the crucible, and about an inch and a half higher than its bottom; then mixing the stucco with water, it is poured into the cylinder. When the stucco is sufficiently set, the white iron is removed, the clay picked out, and the mould dried; soft clay is then squeezed into the mould, which, on standing a few minutes, easily comes out again. It is then enclosed in the cylinder, and stucco poured round it, which forms a second mould: thus proceeding until the number wanted is obtained. They are afterwards put into a stove, and completely dried for use.

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* Abstracted from the Fifth Number of the Edinburgh Philosophical Journal.

In the preparation of the fire-clay for the crucibles, Mr. Cameron follows the same process, which is used at the potteries, by mixing it with a very large quantity of water, and passing the whole, through a No. 9, silk search. On allowing it to stand for a few hours, the clay subsides, and, after pouring off the clear water, the clay or slip is obtained of the consistence of thick cream. On weighing a gallon of it, the proportion of clay which it contains will be known; a proportion of seven parts of sand, is to be then added to seventeen parts of clay; the whole is to be mixed completely, when it will be ready for use. Having arranged the moulds, previously dried, in parallel rows on a table, they are successively filled with the prepared stuff. By the time that four or five dozen are filled, the operator returns to the one first filled, and begins alternately to pour the slip out of them, leaving a small quantity unpoured out, which subsides, and gives a requisite thickness to the bottom. In each of the moulds so filled, a crucible is completely formed by the absorption of the water of the slip in contact with and adjoining to the porous substance of the stucco mould. The crucible will be either thicker or thinner, in proportion to the time the slip has remained in it. Five or six dozen will not require more than fifteen minutes in being formed: the moulds with their contents, are then removed to a stove, placed on their side, and built one above another. In a short time, from the contraction of the clay, the crucibles easily part from the moulds, and are removed by introducing the finger into them. The moulds are allowed to remain in this situation, until the water which they had absorbed, is completely evaporated, when they are again ready for refilling, and will last for years. The crucibles must remain in the stove, until they are dry; after which, they are burned in a kiln in the usual manner.

This process is simple, and combines the advantages of forming them with great facility, and of giving them the required shape, which cannot be accomplished on the potter's wheel. One man and a boy can make from ten to twelve hundred per day. The principle is peculiarly adapted for the formation of a number of chemical apparatus, muffles, retorts, tubes, &c.

The New Bank of England Note, and Messrs. Tilloch and Ferguson's Plan for the Prevention of Forgery.

It appears by an act of Parliament just passed, that the directors of the Bank of England imagine they have, at length, realized a plan for the production of Bank Notes which will effectually prevent forgery. The nature of the intended new note, is stated to be a combination of black, white, and coloured lines, intersecting each other as a ground, in which the written parts are to remain as blanks, and the value of the note to be printed in black, and red register work, the whole of which design is to be also produced upon its back, in an identical reverse impression.

The exclusive privilege of using this plan of printing notes, is now, as a new invention, endeavoured to be monopolized by the Bank Directors, though they are well aware, that it is a combination of some of those very plans, which they rejected many years ago.

It is more than ten years since Mr. Tilloch presented to the Bank Directors, his method of printing notes for the prevention of forgery, in which he proposed to use a combination of black, white, and coloured lines, intersecting each other with a reverse identical impression of the same, given at the back of the note. Subsequently to this, Mr. Ferguson proposed to the Bank Directors, his mode of preventing forgery, by combining a peculiarly formed small type,* calculated to produce the effect of a dark ground, and then cutting away this type, when combined, so as to leave blanks of white writing, considering it impossible to cast a counterfeit type, which, when combined, should so exactly correspond in dimensions with the genuine, that, upon the blanks being cut away, the same letters should be intersected, and the same words be found to remain between the white writing in the forgery, as in the original.

Thus, it must be evident, that the description of note now proposed, is a modification of parts of the plans suggested by these gentlemen, and in our opinion, not the most estimable parts: however, for the sake of humanity and the security of the public, we wish every success to attend the adoption of this, or indeed any plan which might put effectual stop to so alarming and extensive a species of depredation; and we should be most happy, could we perceive the same public security in the Bank Note here proposed, that we think we see in other plans already before the public: but we shall not be surprised, to hear of a similar occurrence to what took place some months back, (viz.) that when the Bank had prepared a five pound note ready for circulation, it was discovered that so exact an imitation was also ready in the hands of certain forgers, that it was deemed prudent to destroy the new note, and re-commence experiments upon another principle.

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* It is stated, that not more than four or five persons in the kingdom could be found capable of cutting such peculiar type moulds.

It does seem to be a most inexplicable mystery, that when simple plans are before the public, which offer difficulties to the forgers that might be rendered absolutely insurmountable, so much of the Bank Directors' money and the public patience should be expended upon uncertain experiments; but we presume that an Hon. Commissioner was perfectly right, when, upon being asked the reason why the Bank had not, in the course of so many years, adopted such plans as those in which other Banks had found protection, he replied, there is no *reason*, but there is a *cause.*

Mr. Perkins's easy Method of constructing a Pump.

A VERY expeditious and easy mode of constructing a pump, has been suggested by Mr. PERKINS, which is to be made out of materials generally at hand, particularly on ship board. It consists solely of planks, leather and nails, (see Plate XIII. Fig. 4.) and may be made as follows: Form a square trunk, by nailing inch boards together of the desired length, and cover the trunk with other similar boards, so as to block joints; three thicknesses of board are sufficient for a five inch chamber, four thicknesses for a six inch, and five for a seven inch. The trunk being made, *a*, Fig. 4. a prop or fulcrum, *b*, is to be attached on the angle of the trunk near its top. A piston rod is then to be made of wood, as shewn at *c c*, Fig. 5, flat and edge views. At the bottom of this rod, the valve or bucket *d*, is attached, formed by a square block of wood, and two triangular pieces, coated and connected to the block by leather. It is intended, that this block should nearly fit the interior of the trunk diagonally, and that the triangular pieces should fall into the angles so as to close the chamber, and produce a bucket as seen by the section, Fig. 6. There is to be a singularly constructed valve, fixed near the bottom within the trunk, as a foot valve; upon placing the piston rod with its valve as above described, in the trunk, and attaching a lever, *e*, by means of two pins, one to the piston rod, and the other to the fulcrum, the pump is ready for action, and the water is discharged at the hole *f*, where a hose may be connected, for the purpose of conveying it away. A pump upon this construction (one of Mr. Perkins's making,) is to be seen in the storehouse at Portsmouth Dock-yard, which was some time ago taken out of an American vessel, captured by the British; and also, one presented by Mr. Perkins for the benefit of the sea service in general, upon any emergency. We understand, that a pump of this description, might be constructed by a ship's carpenter, in about a quarter of an hour, and that two or three of these, under some circumstances, would effectually prevent the sinking of a vessel.

New Method of Ventilating Ships.

Mr. Perkins has also invented a mode of ventilating ships, by pumping the foul air from any part to which the pipes may be applied, by a very simple method, taking advantage of the vessel's pitch and roll as the moving agent. It is proposed to place two water casks in the lower part of the ship, (see Plate XII. fig. 3) as far removed from each other as convenient, but upon a level; their situation is not to be directly athwart the vessel, but diagonally, for the reasons which will follow. These casks are to be half filled with water, and a communication formed between them, for the water to flow, by means of a pipe or hose of about three inches bore from one cask to the other as the ship reels, thus finding its level. These casks are to be made air tight, and into the upper parts of each, two pipes or hose must be inserted with valves; one pipe or hose, to lead from the hole or other part of the ship to be ventilated, the other leading out of the port-holes. The ends of the pipes or hose, that are within the casks, are to be supplied with valves, which the inventor recommends to be diagonal valves if they can be conveniently procured. Those valves which are attached to the pipes or hose, leading from the hole or other part to be ventilated, must be constructed to open outwards, so as to discharge the air that may be forced up the pipes into the casks, and not allow any to return; while the valves which are attached to the other pipes or hose, must open inwards, so as to receive all the air which may be forced from the cask into the pipe or hose, and not allow any to return into the cask. Now, as the vessel rolls or pitches, (suppose the larboard side depressed) the water in the cask *A*, will flow through the communicating pipe *C*, to the lower cask *B*, making it level at the dotted lines, *c*, *c*, when its space, will be occupied with air, drawn up through the pipe *a*. But as the starboard side of the vessel becomes depressed, the water flows back again into the cask *A*, out of *B*, and as the air cannot return down the pipe *a*, owing to the valve closing against it, the valve of the pipe *b*, opening inwards, suffers the air to be forced up the pipe *b*, and discharged out at the port-hole, while another portion of air from below, will occupy the cask *B;* which, in its turn, becomes expelled by the return of the water into the cask, upon the larboard side of the vessel becoming again depressed. It will be here seen, that if these casks were placed athwart ship, the pumping would be produced by the roll of the ship only. If they were placed along the vessel, the pumping would be produced by the pitch of the ship only; but as they are placed diagonally, advantage is taken of both pitch and roll, and the apparatus, placed as above described, will be always in action.

The casks may stand upon their heads or upon their bilge, which ever may be found most convenient, or metal trunks may be used for the purpose, such as are now generally appropriated to contain water on ship board for the supply of the crew. It is proposed to place several of these apparatus to work in every ship, which may be done without inconvenience, the whole of the materials of which they are constructed, being generally at hand on ship board.

On the Alloys of Steel, and on Indian Steel or Wootz.

Messrs. Stodart and Faraday have made some interesting experiments at the Royal Institution on the alloys of steel.

Being satisfied as to the constituent parts of the excellent Indian steel called *wootz*, they attempted to make such a combination. Many of their experiments were fruitless; the successful method was the following: pure steel in small pieces, and, in some instances, good iron being mixed with charcoal powder, were intensely heated for a long time; in this way they formed carburets, which possessed a very dark metallic grey colour, something in appearance like the black ore of tellurium, and highly crystalline. When broken, the facets of small buttons not weighing more than 500 grains, were frequently above the eighth of an inch in width. The results of several experiments on its composition which appeared very uniform, gave 94·36 iron + 5·64 carbon. This being broken and melted to powder in a mortar, was mixed with pure alumine, and the whole intensely heated in a close crucible for a considerable time. On being removed from the furnace and opened, an alloy was obtained of a white colour, a close granular texture and very brittle; this, when analysed, gave 6·4 per cent. of alumine, and a portion of carbon not accurately estimated; 700 of good steel, with 40 of the alumine alloy were found together, and formed a very good button perfectly malleable; this, on being forged into a little bar and the surface polished, gave, on the application of dilute sulphuric acid, the beautiful damask belonging peculiarly to wootz. A second experiment was made with 500 grains of the same steel, and 67 of the alumine alloy, and this also proved good; it forged well and gave damask. This specimen has all the appreciable characteristics of the best Bombay wootz.

These gentlemen ascertained by direct experiment, that the wootz, although repeatedly fired, retains the peculiar property of presenting a damasked surface when forged, polished, and acted upon by dilute acid. This appearance is apparently produced by a dissection of the crystals by the acid: for though by the hammering the crystals have been bent about, yet their forms may be readily traced through the curves, which the twisting and hammering have produced. From this uniform appearance on the surface of wootz, it is highly probable that the much-admired sabres of Damascus are made from this steel; and if this be admitted, there can be little reason to doubt that the damask itself is merely an exhibition of crystallization.

In making the alumine for the imitation alloy of wootz, plumbago was formed soft, sectile, bright; it stained paper, and had every other character of that body.

Imitations of *meteoric iron* were made by combining iron with nickel, in various proportions, with perfect success. To imitate Siberian meteoric iron, good iron was fused with ten per cent. of nickel; the metals were perfectly combined, but less malleable, being disposed to crack under the hammer. The colour, when polished, had a yellow tinge. A piece of the alloy being exposed to the moist air for a considerable time, together with a piece of pure iron, they both rusted a little; not, however, to the same extent: that with nickel being but slightly acted upon, comparatively to the pure iron; it thus appears, that nickel, when combined with iron, has some effect in preventing oxidation, though certainly not to the extent that has at times been given to it. It is a curious fact, that the same quantity of nickel alloyed with steel, instead of preventing its rusting, appears to accelerate it very rapidly.

Platinum and rhodium have been alloyed with *iron*; but these compounds do not appear to possess any very interesting properties. The alloys of other metals with *iron*, as far as these experiments go, do not promise much usefulness, but the results with steel are very different. Together with some other of the metals, the following have been alloyed with both English and Indian steel in various proportions: platinum, rhodium, gold, silver, nickel, copper and tin.

Silver and steel will not combine advantageously when the silver is in large quantity, but 1 part silver and 500 of steel yield a very perfect button; it forges remarkably well, although very hard, and has, in every respect, a most favourable appearance. It is decidedly superior to the very best steel, and this excellence is, unquestionably, owing to the combination of a minute portion of silver. Various cutting tools have been made from it of the best quality. This alloy is, perhaps, only inferior to that of steel with rhodium, and it may be procured at small expence: it will be, probably, applied to many important purposes in the arts.

The alloys of steel with platinum, when both are in a state of fusion, are very perfect in every proportion that has been tried. Equal parts form a beautiful alloy, which takes a fine polish and does not tarnish; the colour is the finest imaginable for a mirror. The specific gravity of this beautiful compound is 9·862. The proportions of platinum which appear to improve steel for edge instruments, are from 1 to 3 per cent. An alloy of 10 of platinum and 80 of steel, after lying months, had not a spot on its surface indicative of oxidation.

The alloys of steel with rhodium are likely to prove highly valuable. The scarcity of that metal must, however, operate against its introduction. The proportions used were from 1 to 2 per cent. The valuable properties of this alloy is hardness, with sufficient tenacity to prevent cracking, either in forging or in hardening.

Gold forms a good alloy with steel, but it does not promise to be of the same value as the alloys of silver, platinum, and rhodium. Of the alloys of steel with tin and copper, the value is not so decided; further trials are, however, necessary on these two metals.

Journal of Science.

Polytechnic and Scientific Intelligence.

GREAT BRITAIN.

Society of Arts.

THIS Society closed its session on the 14th of June. It still continues to offer a variety of rewards, either in money or medals for the promotion of both the useful and fine arts. Perhaps we cannot more effectually serve the interests of the arts, artists, and the public, than by giving a list of the different subjects for which this Society now offers premiums. Of course, whatever the Society has hitherto done in promoting or stimulating to discoveries, &c. must be still considered as imperfect, or the premiums for any particular art would not be offered.

Premiums in Agriculture.

For setting acorns.—Raising oaks.—Best method of raising oaks. — Elm. — Larch. — Ash. — Forest trees.— Norway fir seedlings.—Chesnuts.—Walnut trees.—Walnuts.—Securing plantations. —Wheat. — Beans. — Grass seeds.—Hemp.—Potatoes.—Preserving turnips, carrots, parsnips, beets or mangel worzel.—Preserving cabbages. —Making meadow hay in wet weather. — Harvesting corn in wet weather.—Gaining land from the sea.—Improving waste land.—Manures.—Irrigation of land.—A paring plough.--A dibbling machine.--A thrashing machine. —Destroying the grub of the cock-chafer.—Destroying worms.—Destroying the fly on hops.— Preventing the blight on fruit trees and culinary plants.—For scraping the bark off fruit trees.—Cure of the foot-rot in sheep.—Preventing the ill effect of flies on sheep.—Protecting sheep.—Feeding cattle.—Bees, wax, and honey.

In Chemistry, Dyeing and Mineralogy.

For increasing steam.—Prevention of smoke.—Coal gas.—Preventing the ill effects of smelting ores.—Fine bar iron.—Refining copper from the ore.—Preparing brass.—Improved earthenware crucibles.—Preparation of the sulphuric acid from sulphur without the use of any nitric salt.—Preparation of any alkaline or earthy nitrate.—Glazing common earthenware without lead or arsenic.—Crown glass.—Flint glass.—Dyeing silk or woollen.—Dying with lac lake.—Improved black dye for silk or wool.—Preparation of a red stain for cotton cloth.—Preparation of a green colour for printing cotton cloth.—British indigo.—Substitute for the basis for white paint.—Permanent white paint for the use of artists.—Red pigment.—Ultramarine.—Colourless lac varnish.—A substitute for lead pipes.—Substitute for tar.—Turpentine from the Scotch fir, or Pinus Sylvestris.—Preparation of tar.—Preserving seeds or vegetables.—Preserving salted provisions from becoming rancid or rusty.—Preserving iron from rust.—Preventing the dry rot in timber.—The destructive effects of moths.—Rendering leather waterproof.—Refining whale or seal oil.—Manufacturing tallow candles.—Indelible ink.—Printer's ink.—Copper-plate printer's ink.—Superior oil for chronometers and watches.—Statuary marble.—Stone for lithography.—Mineralogical county maps.—Mineralogical map of Ireland.—Mineralogical map of Scotland.—Natural history.

Premiums in the Polite Arts.

For original paintings, drawings or copies *by the Nobility.*—Original paintings, drawings, or copies *by Gentlemen or Ladies.*—Historical landscape, paintings, or drawings or copies, in oil or water colours, *by artists and others.* — Drawings from sculpture. — Perspective drawings.—Architectural designs.—Models.—Anatomical models.—Etching of an historical subject.—Etching of a landscape.—Historical engravings.—Landscape engraving;—Engraving of a portrait.—Engraving on steel.—Engraving on wood or metal blocks.—Lithography.—Medal die engraving.

Premiums for encouraging and improving Manufactures.

For cloth from hop-stalks, nettles, &c.—Sheep's wool. Wicks for candles or lamps.—Wicks for candles.—Paper from raw vegetable substances.—Transparent paper.—Chintz-pattern for calico printers.—Copper plate patterns. Gloves.—Cat-gut.—Hose for fire engines, brewhouses, &c.—Thread for lace.

Premiums in Mechanics.

For gun-powder mills.—A family mill.—Portable mill for grinding corn.—A portable oven.—Machine for raising coals, ore, &c. &c.—Improved walking wheel or crane.—Machine for raising water.—Extinguishing fires.—Boring and blasting rocks.—Heating rooms for the purpose of manufactures.—Improved ventilation.—Ventilating coal mines.—Preventing accidents from stage coaches.—Preventing accidents from horses falling with two wheeled carriages.—Improving turnpike and other roads.—Raising the bodies of persons who have been sunk under water.—Preventing prejudicial effects to the persons pointing needles.—Preventing explosions in steam engines and other covered boilers.

Premiums for the Commerce of the United Kingdom.

Taking whales by the gun harpoon.—Taking porpoises.—Oil from porpoises or seafish.—Curing herrings.—Exporting British cured herrings.—Curing mackarel.

Premiums for the Advantage of the British Colonies.

For Nutmegs.—Kali or Barilla.—Destroying the insect commonly called the borer.—Cultivation of Hemp in Upper Canada.—The same in Lower Canada.—The same in Nova Scotia and New Brunswick.—Importation of hemp from Canada, Nova Scotia and New Brunswick.—Substitute for hemp.—Silk.—Wool from New South Wales.—Fine wool from New South Wales.—Extirpating the stumps and roots of trees.

Premiums for the Advantage of the British Settlements in the East Indies.

For India paper for copper-plate printing.—Bhaugulpore cotton.—Annatto.

Relative to *British Marbles.* The society considering that it would be beneficial to the commerce of the united kingdom, to bring them into general use, and that the most effectual method of accomplishing this object, would be to make them more generally known in the capital, have resolved, that specimens eight inches high, six inches broad, one thick, and polished on one face, may be exposed in the Society's Room in the Adelphi, for the inspection of the public. The proprietors of marble quarries, are therefore requested to avail themselves of this permission. A variety of specimens are already collected and exhibited.

Royal Society.

The following papers have been read at the table of this Society, during the last half year.

An account of a case of Ovario-gestation, by Dr. Granville.—On some Combinations of Platinum by Mr. E. Davy.—On the Methods of cutting Rock-crystal, for Micrometers, by Dr. Wollaston.—On a new Principle of constructing Ships in the mercantile Navy, by Sir Robert Seppings.—On a Peculiarity in the

Structure of the Eye of the Balœna Mysticetus, by Mr. RANSOME.—On the Law of the Variation of the Flexibility of Canadian Fir, by M. C. DUPIN.—On the means of supplying muscles, in a state of spasm or paralysis, with nervous power, by Mr. J. HOOD.—On the milk, tusks, and organs of hearing of the Dugong, by Sir E. HOME.—On the improvement in the eye tubes of portable achromatic Telescopes, by Dr. KITCHENER.—On the different qualities of the alburnum of spring and winter-felled oak-trees, by T. A. KNIGHT, Esq.—On the properties of domes and their abutment walls, by S. WARE, Esq.—On diarrhœa asthenica, by MR. HOOD.—On the mode of formation of the canal for containing the spinal marrow, and on the form of the fins of the proteosaurus, by S. E. HOME.—Some experiments on the fungi, which constitute the colouring matter of the red snow discovered in Baffin's Bay, by F. BAUER, Esq.—Some account of the Dugong, by Sir T. S. RAFFLES.– On the compressibility of water, by Mr. PERKINS.

The chair of this society, vacant by the death of the venerable Sir JOSEPH BANKS, on the 19th of June last, in his 77th year, and in which he sat for forty-two years, has not yet been filled, except *pro tempore.*

Royal Society of Edinburgh.

The following papers have been read before this society during the current year. Speculations on the nature of sound, by Sir GEORGE MACKENZIE.—On the nature and properties of the marsh poison, as known under the name of marsh *miasmata* and *malaria*, by Dr. FERGUSSON.—On the radication of caloric and the apparent radication of cold, by the Rev. Mr. HOLLAND—On the mean temperature of the earth, by Dr. BREWSTER.—On the dramatic poets of Scotland, by HENRY MACKENZIE, Esq.—On the similarity between the rocks of Faroe and Salisbury Crags, by Mr. ALLAN.—On a new species of lead ore, by Dr. BREWSTER.—A notice on the properties and culture of the *Phormium tenax*, by Dr. YULE.—A paper on chances, by C. BABBAGE, Esq.—Notice respecting a new construction in the aplome garnet.—On a new machine for measuring the dip of the needle, by Mr. SCORESBY.—An account of his views respecting granite veins, and other points in geognosy, by Professor JAMESON.—An account of the pyramids of Gizé, by Lieut. Col. STRATON.—A notice respecting a singular structure in the diamond, by Dr. BREWSTER.—A full account of the Egyptian temples, by Lieut. Col. STRATON.—A short notice, by Dr. DUNCAN, Jun. on the STETHOSCOPE, an instrument invented by M. LAENNEC, physician of the Hospital Neckar at Paris, for investigating the diseases of the organs, of the chest. This instrument is exceedingly simple, consisting merely of a cylinder about a foot long, and an inch and a half in diameter, pierced lengthwise by a hole three-eighths of an inch wide, and widened at one end in the form of a funnel, the whole diameter of the cylinder. It acts partly as a prolongation of the external ear, and partly by magnifying the sounds within the chest. So far as Dr. Duncan's experience went, he found M. LAENNEC's observations to be correct, and he considers the instrument as well calculated to improve our knowledge of many very important and obscure diseases.—An account of the strata of diamond mines at Malyvully, by the late Dr. JAMES ANDERSON, of Madras.—An account of some idols brought from India by James Simpson, Esq. by Mr. CADELL.—A biographical account of the late Dr. Daniel Rutherford, by Dr. DUNCAN, Sen.

The Astronomical Society.

The following papers have been read at this society: —On the doubly refracting power of rock crystal, as a mean of micrometrical measurement, by the Rev. Dr. **Pearson**.—On the construction and use of a new micrometrical eye-piece, by the same.—An account of the means taken for establishing an observatory at Cambridge, by the Rev. G. **Peacock**.—On double stars, by **James South**, Esq.

Cambridge Philosophical Society.

The following papers have been read to this Society, during the present year. A notice explanatory of a curious fossil body, picked up on the coast of Scarborough, by Dr. **Thackeray**.—On Isometrical Perspective, by the President, **Professor Farish**.—On his discovery of *Cadmium* in some of the English ores of Zinc, by Dr. E. D. **Clark**.—The result of experiments made in order to determine the soundings at sea, by Capt. **Fairfax**.—On the weathered surfaces of several specimens of calcareous sand stone, found in the cliffs near Scarborough, by the Rev. J. **Hailstone**.—On the reduction of certain classes of functional equations to equations of finite differences, by J. F. W. **Herschel**, Esq.—On some fossil remains of the beaver found near Chatteris, Cambridgeshire, by Mr. J. **Okes**.—On the Geology of Cornwall and some other parts of the coast of England, by Professor **Sedgwick**.—A translation from Gemmclaro's MS. account of the eruption of Ætna in 1819, by Mr. **Thompson**.—A letter from the Rev. G. **Davis**, detailing certain optical phenomena observed at Kilhampton in Cornwall, on April 5th, 1820.—On the rotation impressed by plates of rock crystal on the planes of polarization of the rays of light as connected with certain peculiarities of its crystallization, by J. F. W. **Herschel**, Esq.—On the position of the apsides of orbits of great eccentricity, by Mr. **Whewell**.—On Polar Navigation, by the **President**.—On certain remarkable instances of deviation from Newton's scale in the tints, developed by crystals, with an axis of double refraction or exposure to polarised light.—Observations on the notations employed in the calculus of Functions, by C. BABBAGE, Esq.—On the mathematical principles of chemical philosophy, by Mr. EMMET.—On the purple precipitate of Cassius, by Dr. CLARKE, who concludes from his experiments, that the two metals which are chemically combined in it, do not exist in a constant relative proportion; that in whatever proportion the gold may exist, with regard to the tin in the purple precipitate, there is no evidence to warrant the opinion of its being in the metallic state.—On the laws according to which masses of iron influence magnetic needles, by Mr. CHRISTIE.

The Use of Pyrolignous Acid, in the Preservation of Food.

IT appears by a paper of Mr. RAMSAY, in No. V. of the *Edinburgh Philosophical Journal*, that on the 10th of July 1819, herrings cleaned in the common manner, without being salted, but immersed for three hours in distilled pyrolignous acid of the specific gravity of 1.012, were considerably softened, and had not the firmness of fish taken from a pickle of common salt. In this state, they were hung on a rod to dry in the shade, were frequently examined, and though the months of July and August were very hot, they had not the slightest sign of putrefaction; on the contrary, the smell was quite wholesome, although joined with the flavour arising from immersion in the acid. On broiling one of the herrings, the empyreumatic smell was strongly developed, and the fish were by no means agreeable to those who are not accustomed to this flavour; but after being kept for upwards of six months, they remained in a state of complete preservation. From experiments since made, Mr. Ramsay has found that pyrolignous acid of the specific gravity of 1.012 is too strong for the immersion of fish, so long as three hours, but that simply dipping them in the acid of the above strength is sufficient for their preservation, if they are afterwards dried in the shade: on boiling herrings treated in this manner, they were very agreeable to the taste, and had nothing of the empyreuma which the first experiment mentions. Mr. Ramsay has also combined this method of preserving fish with that of salting: a number of fine haddocks were cleaned, split, and slightly sprinkled with salt for six hours. After being drained, they were dipped for about three seconds in pyrolignous acid, and then hung on a spit in the shade for eight days, before being used. On being broiled, they were of an uncommonly fine flavour, delicately white, and were equal to what are called finnan haddocks, which are so much esteemed. As a comparative experiment, one of the fish was suffered to remain in the acid twelve hours: it was soft and tender; on broiling it, the same bad qualities were evident, as in the herrings which remained in the acid three hours. Herrings subjected to the same process as the haddocks, that is, first slightly cured with salt, drained, and then immersed for a short time in the pyrolignous acid, after being dried in the shade for two months, possessed the quality and flavour, and were equal to those, of the best red herrings; the fish retained the shining and fresh appearance, which they have when taken from the sea.

When these experiments were begun, viz. in July, 1819, a piece of fresh beef was dipped in the pyrolignous acid of the specific gravity of 1,012; it was not immersed more than one minute, and, on the 4th of March, 1820, was as free from taint, as on the day when the experiment was made: no salt was here used. At the same time, a piece of beef dipped in pure vinegar of the specific gravity of 1,009, and in the November following it was perfectly free from taint: when boiled, it had a very agreeable sub-acid taste. Mr. Ramsay has since cured haddocks with pure vinegar: they remain free from taint, but when cooked, have an insipid taste, from the want of the slight saline to which we are accustomed.

From several trials made on beef, it appears that when it is partially salted and then steeped for a short time in pyrolignous acid, after being drained and cooked, it has the same flavour as Hamburgh beef; and there seems little doubt, that with proper modifications, its use may be extended, to the preservation of every species of animal food.

It appears, that when vinegar of a stronger quality than that of the specific gravity of 1,009 is used, and the fish is allowed to remain in it for a few minutes, it is entirely dissolved, particularly if aided by heat. But both fish and beef dipped in vinegar of the specific gravity of 1.009, and afterwards dried in a summer heat, remain perfectly free from taint. From some other experiments, it appears that fresh meat wiped over with a cloth, moistened with vinegar of the specific gravity of 1.034 has been kept sweet and fresh during the heat of summer, several days longer than it otherwise could have been.

When pyrolignous acid seems too impure for further use, it may be clarified thus: a dozen of fresh eggs after being well beaten up, may be added to every twenty gallons of the impure acid, and which is to be heated in an iron boiler. Before boiling the eggs coagulate and bring the impurity to the surface of the boiler, which must be carefully skimmed off. The acid must then be withdrawn from the boiler, as it is a solvent of iron which will darken its colour.

In *purifying common herring brine,* Mr. Ramsay advises that it should be diluted with water to the specific gravity of 1,160, put into a cast-iron boiler, and to every thirty gallons of English wine measure, a dozen of eggs should be beaten up, and mixed with the brine; at the same time, about half a pound of finely powdered charcoal should be put into the boiler, and the whole well stirred together; the brine being below saturation, when heated, allows the impurity contained in it, to rise to the surface, and when brought to boil, it must be completely skimmed off; the liquid on cooling, will be as clear as water.

GERMANY.

Mr. **Jacob Reitmayer**, a merchant of Mayence, has invented a machine to ascertain the amount of the cargo which a vessel is able to contain, and also to determine its exact weight. This machine resembles in its principles, the platforms used on land, for weighing waggons, &c. It is built in the water, at a place where the depth is always the same, whither the ships when empty are brought, and you may tell with the greatest accuracy, by means of a scale or scales at the sides of the machine, how high and how broad the vessel is, and what is its weight in the water when empty. As the scale is calculated upon hydraulic principles from decimeter to decimeter, according to the make of the ship in its cubit contents, and according to the buoyant power of the water, nothing more is necessary, than to place the vessel when loaded in the machine, which will immediately shew the weight of the vessel and cargo from which the weight of the vessel when unloaded, is to be deducted.

New Patents Sealed in 1820.

To John Hague, of Great Pearl Street, Spitalfields, London, Engineer, for an improvement in preparing the materials for making potteryware, tiles and brick.—Sealed, June 2nd.—Six months for Inrolment.

To William Bate, of Peterborough, Northamptonshire, Esq. for a combination of, and addition to machinery, calculated to increase power.--Sealed, June 3rd.—Six months for Inrolment.

To William Bate, of Peterborough, Northamptonshire, Esq. for certain improvements in preparing hemp, flax, and other fibrous substances for spinning. —Sealed, June 3rd.—Four months for Inrolment.

To Simeon Teissier, of Paris, but at present residing in Bucklersbury, London, Merchant, for certain improvements in propelling vessels, communicated to him by a certain foreigner residing abroad.—Sealed, June 3rd.—Two months for Inrolment.

To Jacob Perkins, late of Philadelphia, but now of Austin Friars, London, Engineer, for certain improvements in the construction of fixed and portable pumps; such as pumps fixed for raising water from wells and other situations, or ship pumps, or for portable pumps which may be employed for garden engines, or in engines for extinguishing fire, or other purposes.—Sealed, June 3rd.—Six months for Inrolment.

To John Hague, of Great Pearl Street, Spital-fields, London, Engineer, for certain improvements in the making and constructing steam engines.--Sealed, June 3rd.—Two months for Inrolment.

To John Wakefield, of Ancott's Place, Manchester, Lancashire, Engineer, for certain improvements in the construction of furnaces for boilers of various descriptions, and in the mode of feeding the same with fuel, which improvements are calculated to lessen the consumption of fuel and to burn the smoke.—Sealed, June 6th.—Six months for Inrolment.

To William Kendrick, of Birmingham, Warwickshire, Chemist, for the manufacture of a liquid from materials now considered useless for that purpose, and the application of the same liquid to the tanning of hides, and other articles requiring such process.—Sealed, June 6th.—Six months for Inrolment.

To Jonathan Brownill, of Sheffield, Yorkshire, Table Knife Cutler, for a method of better securing the blades of table knives and forks in the handles, by means of caps being soldered upon the tangs, whether of iron, steel or other material, after the handles are upon them.—Sealed, June 8th.—Two months for Inrolment.

To Samuel Parker, of Argyle Street, London, Bronzist, for an improved lamp.—Sealed, June 15th.—Two months for Inrolment.

To the Hon. William Erskine Cochrane, of Somerset Street, Portman Square, London, for an improvement in the construction of lamps.--Sealed, June 17th.--Six months for Inrolment.

To Joseph Woollams, of Wells, Somersetshire, Land Agent, for certain improvements in the teeth or cogs, formed on or applied to wheels, pinions or other mechanical agents for communicating or returning motion.—Sealed, June 20th.—Six months for Inrolment.

To John Butler Lodge, and John Bittleston, Jun. both of the Strand, London, Truss-Makers, for certain improvements in the construction and application of spring trusses or bandages for the relief or cure of hernia.—Sealed June 20th.—Two months for Inrolment.

To John Vallance, of Brighton, Sussex, Brewer, for a method and apparatus for freeing rooms and buildings, whether public or private, from the distressing heat sometimes experienced in them, and of keeping them constantly cool, or of a pleasant temperature, whether they are crouded to excess or empty, and also whether the weather be hot or cold.—Sealed, June 20th.—Six months for Inrolment.

To John Vallance, of Brighton, Sussex, Brewer, for a method and apparatus for packing and preserving hops.—Sealed, June 20th.—Six months for Inrolment.

To John Shaw, of Mary Street, Fitzroy Square, London, Watch-maker, for a new method of making bricks by machinery.—Sealed, June 21st.—Six months for Inrolment.

To James Harcourt, of Birmingham, Warwickshire, Brass-founder, for an improvement in castors applicable to tables and other articles.—Sealed, June 21st.—Two months for Inrolment.

To Samuel Fletcher, of Walsall, Staffordshire, Sadlers' Ironmonger, for an improvement on, and additions to saddles, saddle straps, saddle girths, and saddle cloths, by the application of certain known materials hitherto unused for that purpose.—Sealed, July 11th.—Four months for Inrolment.

To James White, of Manchester, Engineer, for certain new machinery adapted to preparing and spinning wool, cotton, and other fibrous substances, and uniting several threads into one: and also certain combinations of the said new machinery with other machines already known and in use.—Sealed, July 11th.—Six months for Inrolment.

To John Read, of Horsmonden, Gent. Kent, for certain improvements on syringes.—Sealed, July 11th.—Two months for Inrolment.

To William Davis, of Bourne, near Minchinhampton, Gloucester, Engineer, for certain improvements in machinery for shearing or cropping woollen and other cloths requiring such process.—Sealed, July 11th.—Six months for Inrolment.

To William Dell, of Southampton, Auctioneer, for an improvement in gun barrels.—Sealed, July 20th.—Two months for Inrolment.

To John Hudswell, of Addle Street, London, Wafer Manufacturer, for an improvement in the manufacture of wafers.—Sealed, July 20th.—Two months for Inrolment.

To Matthew Bush, of Battersea Fields, Surrey, Calico Printer, for an improvement on a machine now in use, for printing silks, linens, calicos, woollens and other similar fabrics, by means of which improvements, shawls and handkerchiefs can be printed with one or more colour or colours; and whereby linens, calicos, silks, woollen and other fabrics of the like nature, intended for garments, can be printed with two or more colours.—Sealed, July 20th.—Two months for Inrolment.

To John Grafton, of Edinburgh, Engineer, for a new and improved method or methods of distilling off the products of coal, and carbonizing coal in the process of making gas, used for the purpose of illumination — Sealed, July 20th. - Six months for Inrolment.

To Robert Bowman, of Manchester, Manufacturer, for improvements in the construction of looms for weaving various sorts of cloths, which looms may be set in motion by any adequate power.—Sealed, July 20th.—Six months for Inrolment.

To Job Rider, of Belfast Foundry, Ireland, Ironfounder, for certain improvements which produce a concentric and revolving eccentric motion, applicable to steam engines, water pumps, mills and other machinery.—Sealed, July 11th.—Six months for Inrolment.

To Henry Botfield Thomason, of Birmingham, Warwickshire, for certain improvements in the making and manufacturing of cutlery, viz. that species of cutlery, called or styled table knives, desert knives, fruit knives, pocket knives, scissars, razors, and surgical instruments.—Sealed July 20th.—Two months for Inrolment.

In consequence of a peculiar press of matter in the patents, we have not been enabled to supply the usual number of plates in the present number, but their deficiency will be made up in the next.

☞ Whilst we feel grateful that the original matter contained in this work, is thought of sufficient importance to attract the notice of our contemporaries, and is referred to, and quoted from accordingly; we think that when our information or sentiments *are quoted*, civility requires an acknowledgment of the sources from which such information or sentiments are drawn. We are very desirous to promote the diffusion of a knowledge of the Arts by every honourable means in our power; but we do think that no one has a right to adopt the original information in this work, which is obtained at considerable expense and trouble, without such acknowledgment.—*Suum cuique.*

W. Shackell, Printer, Johnson's-court, Fleet-street, London.

THE

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JOURNAL OF ARTS AND SCIENCES.

No. V.

Recent Patents.

To DANIEL TREADWELL, *late of the United States of America, but now resident in London, for certain Improvements in the Construction of Printing Presses.*[*]

THIS improved press for printing from types, differs considerably in its construction from others heretofore in use. The power necessary for giving the impression is obtained by means of a lever or treddle worked by the foot, instead of horizontal levers, as applied to that purpose in the Stanhope and other printing presses. The table also in this press is fixed, instead of sliding under the plattin as usual, and the plattin with the tympan and frisket turns over on the form of type. There is besides a mode of reversing the frisket, which is made double, (applicable to half-sheet work) so that the sheet may be printed on both sides without shifting. Plate XIII. fig. 1, represents a side view of the press with the tympan and frisket folded upon the platten, and the platten turned down upon the form. Fig. 2, represents a front view of the press with the platten turned up off the form, and the tympan and frisket open. The action of the press is as follows:

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[*] Manufactured by Messrs. Baisler and Napier, Lloyd's-court, Crown-street, Soho.

Having placed the sheet of paper to be printed upon the tympan, *a*, fold down the frisket, *b*, upon it as usual, and then turn over the plattin, *c*, down upon the form, *d*, as seen in fig. 1. To obtain the pressure, the workman then steps upon the treddle, *e*, which brings down the bar, *f*, and by means of the knee-joint, *g*, the arms, *h*, and *i*, become straightened, and, consequently, the main lever swinging upon the pivot, *j*, is raised at the hinder part, *k*, and depressed at the front part, *l*.

Thus, the descent of the lever at *l*, by the means above described, throws a great weight upon the plattin for the purpose of imprinting the sheet of paper previously (as above) placed between it and the form of types, *d*, which is upon the table.

By the descent of the treddle the instant before the impression is given, another action is also obtained for the purpose of bringing the hammer, *m*, into a perpendicular direction, in order to meet the block, *n*, where the legs of the platten all unite. The rod, *o*, attached at the bottom to the treddle, *e*, communicates also near its top by a connecting bar, *p*, with the hammer, *m*. The top of the rod, *o*, is bent, and as it slides down through a guide, *q*, by the descent of the treddle, the connecting bar, *p*, moves the hammer, *m*, from its *inclined* pendent position into a *perpendicular*, ready to press directly upon the block, *n*, of the platten.

When the foot of the workman is removed from the treddle, *e*, it rises by the re-action of the compressed parts, aided by a spring, *r*; at the same time the hammer, *m*, shifts from the block, *n*, in order to allow the platten to rise, and the type to be inked afresh.

The platten and its arms being of considerable weight, a counterpoise, as it turns over, is effected by the spring, *s*, and weight, *t*, acting upon the frame or lever, *u*, which by the rod, *w*, hanging upon the bent arms of the platten, balance its weight, and render its motion easy to the workman.

Fig. 3, represents the platten, tympan and frisket, detached from the press, for the purpose of exhibiting their parts and actions more distinctly, as respects the method of reversing the sheet, without removing it from between the double frisket; *c*, is the platten, upon the sides of which are two pivots; *x*, is a bar connected to two arms, *y y*, in which the double frisket is enabled to turn over upon centres; when the sheet is printed on one side, and the platten thrown open, the bar, *x*, is depressed by the right-hand, which raises the double frisket holding the sheet of paper, *z*; the left-hand then instantly turns it over, and the sheet is, by another impression, perfected.

There is great simplicity and originality in the construction of this press : its operations are conducted with more facility than any other that we have seen; and as the rolling of the table, and the horizontal movement of the bar, are dispensed with, the labour is considerably reduced. When habit has rendered the action of this press familiar to the workman, we entertain not the smallest doubt that it will be held in general esteem; and we have only to add that many printers who have had an opportunity of observing its action, consider it a valuable improvement in the art.

Inrolled, August, 1820.

To GEORGE LILLEY, *of Brig, Lincolnshire, for certain Improvements in the Construction of Engines, or Machinery, (to be wrought by Steam or other Elastic Fluid,) applicable to the driving of Mills and other useful purposes.*

THESE improvements consist of various parts: First, in a mode of compressing or condensing atmospheric air or other elastic fluids, and, afterwards, heating the same in its compressed state for the purpose of rendering it sufficiently elastic to work a piston by its expansive force; by which, in comparison with steam, the consumption of fuel is diminished, and less room occupied than by a steam engine in its usual form of similar power, and without the necessary use of water. Secondly, in a mode of giving the operating valves a rotatory motion, and, by the intervention of a fluid, to render them perfectly steam and air tight. Thirdly, in a mode of supplying the working pistons of steam or air engines with a substance capable of reducing friction, and, at the same time, preventing the escape of steam between the piston and cylinder from the upper to the lower side of the piston, and *vice versâ.* And fourthly, in a mode of converting an alternate into a rotatory motion, or a rotatory into an alternate motion.

In the first part of the improvement, there are two air-pumps employed for condensing the atmospheric air or other elastic fluid or vapour, one of which is small and worked by hand, for the purpose only of charging the air reservoir in order to put the machine in motion. The other is much larger, and is worked by connecting rods or arms from the beam of the engine, when it is in action. This air pump or condenser is surrounded by a cistern of cold water for the purpose of cooling the air while it is condensing; and, by this pump, the condensed air is forced into the air reservoir. The air reservoir itself, acting in the capacity of a steam-boiler, is placed in a furnace or over a fire, and, when charged with compressed air by the condensing pump, the air becomes heated, and, accordingly, expanded or rendered elastic. A pipe from the air reservoir leads to the working cylinder in which the rarefied vapour, by its expansive force against the upper or under sides of the piston, depresses or raises it in the same way as in a steam-engine.

The reservoir is proposed to be of cast iron formed as a cylinder, but with dome or spherical extremities, surrounded by an outer case or jacket, the space between which and the reservoir is to be occupied by a non-elastic fluid, as mercury, bismuth and lead in a fluid state; oil, or water; connected to this passage, formed between the reservoir and its jacket, is an air vessel, and also a safety valve with a piston and weight floating in the fluid, in order to prevent the explosion of the reservoir: for whenever the increased force of the expanded vapour causes the side of the reservoir to swell, the fluid will rise in the air vessel, and, at the same time, the valve be lifted up. This surrounding fluid assists also in communicating a regular heat to all parts of the reservoir from the fire below.

A similar contrivance is proposed to be applied to the boilers of steam-engines generally, which may be surrounded by or enclosed within a jacket, and encompassed with a non-elastic fluid as above described; or several jackets may be made one within another; the passages between each of which are to be filled with a non-elastic fluid, and an air-vessel and safety-valve attached to each distinct passage; so that the force or pressure of the elastic fluid, or steam in a boiler, will become divided among the several cases, and the tendency to explode be considerably diminished.

From the reservoir, the rarefied elastic vapour passes through a pipe to supply the motive or working cylinder, as of a steam-engine. To increase the effect of the expanded air, the working cylinder is encompassed by a spiral flue, which conducts the heat and smoke from the furnace several times round it.

The second part of the improvement consists in a mode of effecting the induction and eduction of the heated air to and from the motive cylinder by means of a revolving tube, with two passages and valves or openings in the side for its entrance and exit. This tube is enclosed within a case and surrounded by a fluid to render it air-tight. The heated air from the reservoir is introduced at the top of the revolving tube, from which it passes through an induction valve, or opening in the tube, to the interior of the cylinder, first at the upper part or above the working piston, for the purpose of depressing it: as the tube revolves this induction valve, or aperture, becomes shut off, while another induction valve, or opening below, admits the heated air to the lower part of the cylinder for the purpose of raising the piston. At which time the opposite eduction valve, or opening for the exit of the vapour, is brought to the before described passage leading from the upper part of the interior of the cylinder, by which means the heated air is allowed to escape through an exit pipe in any convenient direction to the chimney or elsewhere. In the event of this revolving apparatus being applied to the induction and eduction of steam to a working cylinder and piston, the last described eduction valves will lead to the steam condenser. This revolving tube is turned by means of a cog-wheel placed upon its lower extremity, which takes into a spur-wheel upon the shaft of the fly-wheel, and makes half a revolution to every stroke of the piston, by which the respective valves always open with the same position of the piston, and at the proper times opposite to the openings of the cylinder, and the discharging or condensing pipe.

The third part of the improvement consists in a mode of supplying the working piston with oil or other matter capable of reducing friction, as quicksilver, melted lead or bismuth; this is effected by making the piston hollow, and filling the interior space with any of the before-mentioned fluids, which are contrived to flow through channels into a groove round the periphery of the piston, and hence to relieve its friction against the inner surface of the cylinder; within this piston is a ball-valve balanced upon a fulcrum, and acting either upward or downward into a circular seat by the pressure of the steam or other elastic fluid so as to shut off the oil, &c. from escaping out of the piston; by which means the steam or other elastic fluid is enabled to press through a small opening opposite to the ball-valve upon the oil within the piston, and force it into the channel round the periphery.

The fourth improvement consists in a mode of converting a rotatory motion into a reciprocating motion, and *vice versâ*. This is effected by placing an elliptic ring in an oblique direction round a drum, and bringing two bevil-edged pullies, mounted in a carriage, to act against the two faces or flat surfaces of the ring, the carriage of the rollers being connected to the rod which is to give or to receive the reciprocating motion. If the moving power be applied to the drum, by hand or otherwise, so that it shall revolve, one of the two surfaces of the oblique elliptical ring, placed round the drum, will press against one of the two bevil-edged pullies, and move them and their carriage backward and forward. Or, if the moving power be applied to the rod of a piston so as to give it the reciprocating motion, then the two bevil pullies, acting against the faces of the oblique elliptical ring, will cause the drum to revolve.

The proposed appropriation of a highly rarefied vapour to the working of pistons by its elastic or expansive force, is upon the same principle as the high pressure steam-engine. Many attempts of the kind have been made to apply rarefied air to this purpose, but the extreme danger attendant, and the unmanageableness of the agent, have hitherto rendered every attempt abortive. In theory this plan appears to be tolerably well contrived, yet of its ultimate reduction to practice and advantage, we cannot help entertaining considerable doubts.

The revolving valves proposed, seem calculated to answer the purpose to which they are appropriated; but we do not discover in them any great superiority over the modes at present used for the induction and eduction of steam in our most improved engines. The method of supplying working pistons with oil or other matter capable of reducing friction, bears so close a resemblance to the mode proposed in *Brunton's Patent*, (see page 88,) that, with the exception of the ball-valve, there appears to be scarcely any difference between the two. There are so many modes of transferring motion from reciprocating to rotatory, and rotatory to reciprocating, that it becomes simply a question as to which is effectual with the least friction; and we are of opinion, that the mode here proposed is not in that particular unexceptionable.

Inrolled, May, 1820.

To WILLIAM DELL, *of Southampton, for an Improvement in Gun Barrels.*

THIS invention consists in the introduction of a safety chamber within the barrel of the gun, which may be produced out of the solid metal of which the barrel is formed, by a particular manner of boring; or be made separately, and afterwards soldered, pinned, or otherwise secured at the breech part; or, in the words of the patentee, it consists "in so arranging the bore of a gun-barrel, that the whole of the charge of powder may be retained in a chamber, the bore of which shall be considerably less than the calibre of the gun-barrel, and which chamber shall extend towards the muzzle several inches beyond the breech." The size (query thickness) of the proposed chamber is stated to depend upon its length, of which no proportion is given. There is to be a cup at the end of the chamber to receive the powder, which embraces the whole of the contrivance for which the patent is granted.

Inrolled, September, 1820.

To JOHN HAGUE, *of Great Pearl Street, Spital Fields, London, for certain Improvements in the Method of Heating Hot-houses, Manufactories and other Buildings, and of boiling Liquids.*

IN these improvements, steam passes from a boiler through a pipe placed upon an inclination round the interior of a hot-house, so that it may be received again into the boiler and there condensed. In convenient situations within the hot-house air-boxes are to be placed, through which the steam-pipe is to pass, and these boxes, receiving their supply of air by tubes from the atmosphere without, discharge the same in a warm though pure state into the hot-house, &c.

This mode of introducing pure atmospheric air, at an increased degree of temperature, into hot-houses and other buildings, is so exactly the method proposed in Stratton's Specification for Heating, &c. Inrolled, Jan. 1818, that we cannot help feeling surprise at meeting with it in any subsequent patent. It is true that the present improvement for heating, &c. is stated in the latter part of the specification to consist in the adaptation of two valves, the one to prevent the intrusion of water from the boiler into the discharge-end of the steam-pipe, and the other we could not exactly identify; but this is still employing the method invented by, and exclusively the property of another, which not, until a prior patent-right is declared void on the ground of non-originality by a process at law, must be considered as an infringement.

The mode of boiling liquids here proposed, is by means of steam conveyed into a chamber, in which the vessel containing the liquid is immersed; a mode already practised by every manufacturing chemist. The improvement, however, seems to be in the descending pipe which leads into the boiler for condensing the steam and its valve, which prevents the intrusion of water from the boiler into this return pipe.

Inrolled, July, 1820.

To JOHN GRAFTON, *of Edinburgh, Engineer, for a new and improved Method or Methods of Distilling off the Products of Coal, and Carbonizing Coal in the process of making Gas used for the purpose of Illumination.*

THE new and improved method proposed in this patent, consists in a new construction of the retort or vessel in which the coal is distilled, for the purpose of giving out gas, and which retort, instead of being made of cast iron or any other metal as heretofore, is now proposed to be formed, like pottery ware, of clay moulded and baked. The peculiar material principally recommended for the construction of these retorts, as the most approved and eligible for the purpose, is known by the name of the Stourbridge fire clay. The patentee proposes to form tablets or tiles of this fire clay, with rebate edges, which may be angular or curved so as to fit together, and, when baked, are to be united one to the other with a suitable cement: a portion of the same fire clay of which they are formed will answer that purpose perfectly.

These tablets are designed to be sufficiently large for each of them to form in breadth one angle of the square retort, socketed or rebated together, several, being placed side by side lengthways, and cemented at the rebate joints, are to produce its length. In order to prevent the retort thus constructed from separating, it is proposed to make piers within the oven of the same material (fire clay baked) and upon these piers to erect the retorts as above described; also to place wedges of the same between the oven and the retort, both on the top and sides, so that the contraction or expansion of the retort and all that attaches to it shall be uniform, by which the probability of its cracking is lessened, and the separation of its pieces prevented.

The object of this invention is, to render the retorts used in gas-works more durable; and it is stated in the specification of this patent, that retorts constructed in the manner and of the materials there described, will be found greatly preferable, on the score of durability, to retorts made of cast iron as heretofore.

Inrolled, September, 1820.

To Samuel Shorthouse, *of Dudley, Worcestershire, for a Machine to cut Straw of any length required, thereby rendering Straw a better and more convenient winter Food for Cattle, and the Manure produced in Farm Yards, &c. fit for immediate use; also for rendering dry Straw a manageable Manure; also for cutting Straw to mix with Horse-Corn; also for cutting Straw to any given length for any other purpose.*

The principal novelties of this chaff-cutting machine are, first, in the mode of moving the knife or cutter, and secondly, in the manner of bringing the straw under the knife to be cut.

A handle upon a fly-wheel puts the cutter in motion thus: To a crank on the axis of the fly-wheel, is connected a rod, attached at the other end to a pivot on the upper part of a segment of a cog-wheel, the lower part of which works into a rack placed upon the frame of the cutter; and hence, by the revolution of the crank, the segment of the cog-wheel is made to oscillate and perform part of a revolution backward and forward, which working into the rack before mentioned, gives the cutter a horizontal, alternate motion against the straw, which is supplied and brought under the action of the knife by the following means: the box holding the straw is made to vibrate upon two axles (a scale beam,) when, by pressing down the hinder part of the box, the end of the straw in front is forced up under and against the edge of the knife as it passes along, and hence the straw is cut off to the length regulated by an adjustment.

It will be of course understood, that the front of the box must be curved, so that, as the front of the box rises, the knife shall act uniformly against it. The adjustment for cutting the straw of any given length is contrived by a bolt or pin in the hinder part, which is to be lengthened or shortened at pleasure, and, according to the length of this pin, so many teeth of a racket-wheel in the back part of the box are pushed onward by the revolution of the racket-wheel, and a pressing roller connected to its axis; the straw in the box is advanced into the cutter; or, in other words, the feeding is produced; the length of the chaff thus cut will depend upon the distance which the straw is moved forward at every action of the machine, and that distance will arise from the portion of a revolution on the number of teeth of the racket-wheel, which are pushed on as above described.

There is much ingenuity in the contrivance of this machine, but it appears to be by far too complicated to become generally useful; otherwise we should have given a more particular explanation of its various parts.

Inrolled, March, 1820.

To JAMES HARCOURT, *of Birmingham, Warwickshire, for an Improvement in Castors, applicable to Tables and other Articles.*

THIS improvement consists in the adaptation of anti-friction rollers, which are contrived so as to take off the friction when the castors turn horizontally. The principal novelty of this invention, and indeed that alone which is claimed by the patentee, consists in a conductor or guide plate, by which the anti-friction rollers are confined to a certain course, and enabled to revolve without moving upon poles or axles. Plate XIV. Fig. 2, represents a section of the improved castor. In this figure the socket is supposed to be cut through, and the situation of the anti-friction rollers and guide-plate shown;

a, is the guide-plate seen edge-ways, with the anti-friction rollers in action. The leg of a piece of furniture being fitted into the socket, its weight would rest upon the plate of the wheel-carriage; and as the castor turned horizontally a very considerable friction would ensue. To prevent which, the anti-friction rollers are so placed that by bearing upon the bed *b*, and against the false bottom of the socket *c*, the friction is considerably reduced and entirely taken off the centre pin. Fig. 3. is the guide plate detached from the castor, with the apertures shewn in which the rollers work. These rollers may be either balls or cylinders, and are to be made of a hard metal, or mixture of metals: perhaps a mixture of metals that will not readily contract rust may be found preferable.

This mode of relieving the horizontal friction of castors appears to be new, simple, and efficacious; it is decidedly preferable to any construction of castor heretofore in use, and its cost being but a few pence more than the ordinary castor, there is no doubt that its introduction will be found to give satisfaction and become general.

Inrolled, August, 1820.

To Marc Isambard Brunel, *of Chelsea, Middlesex, for an Invention of certain Improvements in making Stereotype Plates.*

This invention consists, first, in a new mode of taking moulds from the imposed types, or blocks of wood-cuts, for casting from; and, secondly, in the mode of obtaining the cast or stereotype plate from such moulds. The first object proposed by the patentee is, expedition in the mode of producing the stereotype plates, in order particularly to accelerate the printing of daily newspapers; his process is, by pressing the type on to the material which is to form the mould; for which purpose he proposes to make a composition of seven parts pipe-clay, twelve parts chalk or burnt clay, very finely powdered, and one part starch, making twenty equal parts in *bulk*, not weight. These ingredients, being incorporated with water and made into a paste, about the consistency of stiff putty, are to be spread over a steel plate, somewhat larger than the stereotype plate proposed to be cast; which steel plate is to be about the thickness of a saw-blade, and perforated with holes of about the sixteenth of an inch diameter, at half an inch distance from each other. The types being secured in a chase or galley, and the clay spread upon the thin plate of steel, as above described, a skin of parchment is then spread over the composition, and several thicknesses of thin calico (stretched in a light frame) over the types. The plate of steel, connected to the galley of types by hinges, is then, with its layer of clay, covered with the skin of wet parchment, turned over upon the types, and pressed or rubbed with sufficient force to spread or distribute the clay into the general form of the intended stereotype plate. The use of the skin of wet parchment and the coverings of calico is, to prevent immediate contact between the clay and the types while the clay is spreading or disposing itself over the mould plate; the excess of the clay oozes out through the holes in the plate and on the sides. After the general form of the proposed cast is thus produced, the coverings of parchment and calico are then removed, and two thin sheets of paper substituted in their place between the clay and the types. The process of turning the mould plate with the clay on to the types is again repeated, and the whole passed under a rolling press, by which the impression of the types is rendered more distinct. The two sheets of paper are then removed, and the type slightly brushed over with oil, the mould plate is again turned down, and the last or finishing impression given to the mould: the clay and the types being this time brought into immediate contact, the impression of the mould is perfected. The flexibility of the mould plate greatly facilitates the operation, and the thinner the mould plate is rendered the better.

Another mode of producing stereotype moulds is also described, which is by spreading the composition of clay, &c. upon the thin plate of steel, and binding this plate round a roller, which is to be passed over the type, or the types sliding under it, by the agency of a cog-wheel or otherwise, observing that proper rests and a carriage must be made for the axis of the roller, in order to make the thickness of the mould parallel; the progress of the operation is the same as before described; and when the mould is thus perfected the thin steel plate is to be taken off, by which the plate and the mould will return to a flat, and the mould easily dried by exposure to the air, or by a moderate heat; which, if from a stove, must not in any instance exceed 500°; in this way the mould is very expeditiously produced, and rendered fit to cast the type from, by the following means:

The mould plate is placed in a tray of proper dimensions to form the plate, having an edge or rim about one inch high, the bottom of which tray is full of holes, for the purpose of admitting water to cool the mould when the hot metal is poured in to produce the cast. The metal to be used for the stereotype plate may be the same as usual; but when expedition is required, the well known alloy of bismuth ten pounds, lead six pounds, and tin four pounds, may be used by heating it to about

400. The mould-plate being laid in the tray, with the face upwards, a plate of cast iron is placed upon it, raised, by adjusting screws, so as to regulate the required thickness of the stereotype plate about to be cast, and render it perfectly parallel. Things being thus disposed, the whole is to be heated to about 200° before the fused metal is introduced to the mould. When this is done the metal is poured out, having insinuated itself into the mould and filled it up to the regulating plate; cold water is injected by a flexible pipe from a reservoir into the tray, which, coming in contact with the mould, cools the cast immediately. The superfluous edges of the cast are then broken off, the composition of clay, &c. washed from the stereotype cast, and the new formed late may be then considered as fit to be printed from.

As it is requisite to have a great pressure upon the metal when the finest casts are made, it is proposed, under such circumstances, to place the tray with the mould, &c. heated as above, in a chamber which can be closed with a lid and luted so as to be air-tight; this chamber containing the mould may be exhausted, and then the fluid metal introduced by means of a tunnel and stopcock to the mould, which fluid metal, when it has perfectly insinuated itself into the mould, may be acted upon or pressed by condensed air admitted into the chamber from a condenser attached thereto. In this situation cold water can also be injected into the tray for the purpose of cooling the cast as before described.

As the mould plates, even after they have been dried, are sufficiently flexible to bend to any shape, it is proposed, if required, to cast plates shaped in segments of curves, or portions of cylinders, by attaching the moulds to the outsides of the corresponding cylinders, and placing them within other cylinders, so as to leave a parallel space between both for the fluid metal to flow in casting. It is to be observed, that these cylinders must be heated as above before casting is attempted.

A very expeditious mode of constructing a substitute for stereotype plates is also described, by spreading a coating of shell-lac upon a plate of iron, and hardening it by the fire until it is capable of receiving an impression; it is then dipped into the type metal and coated as if tinned, and then placed upon the mould as above made, and left there to cool under a press, which substitute is described as being remarkably perfect and stable; there are several modes of modifying the above plans, which are all claimed as parts of the above recited invention for improvements in making stereotype plates.

Inrolled, July, 1820.

To SIMEON TEISSIER, *of Paris, but at present residing in Bucklersbury, London, for certain Improvements in propelling Vessels, communicated to him by a foreigner residing abroad.*

THE improvement in this patent consists of three parst: the first, relative to the *situation* of the paddle-wheels, in the formation of which no novelty is suggested, consists in placing one or more of such wheels astern of the boat or vessel, to be moved either by steam or animal power as usual. The second, in the adaptation of two rudders to the stern, one to each angle of the vessel, on the outside of the wheels for the purpose of preventing the side current of water from impeding the action of the wheels; or, instead of the two rudders, a casing of wood is to enclose the wheels for the same purpose. The third, consists in constructing the boat or vessel in two parts, so that the portion appropriated to contain the engine and the paddle wheels towards the stern should be capable of being detached from the part appropriated to contain the passengers and luggage; by which means one engine and its set of works might be attached at different times to various boats as occasion required.

Inrolled, August, 1820.

There have been many patents for improvements in the modes of propelling vessels on water, several of which have proposed to place paddle-wheels at the stern, as in the present patent: but experience has long since proved that this situation is not most eligible for the purpose. The idea of adding rudders in order to prevent the current of water from impeding the action of the paddle-wheels is a mistaken one: and enclosing the wheels or casing them round, as above proposed, is found to be productive of considerable impediments to the progress of the vessel. The construction of the boat in two parts, that is, to place the engine and other machinery in a distinct vessel and attach the two together by ropes, chains or otherwise, has been anticipated in a former patent, under the idea that, if by accident (or rather wanton carelessness) the boiler should explode, the passengers might remain safe in the other vessel.

We have before expressed our regret that patentees so frequently neglect to avail themselves of the information and experience to be obtained from persons professionally acquainted with the progress of improvement in the arts: to foreigners this must be particularly necessary, as it is impossible that they can know the actual state of their practice in this country.

To JOHN WORNUM, *of Wigmore Street, Cavendish Square, London, for an Improvement on Piano-Fortes, and certain other Stringed Instruments.*

THE patentee proposes to take, for example, a cabinet piano-forte, and determine the length which he deems eligible to be given to the longest *plain* string. He then sets off that length on a monocord, and after having determined the size of the string and the tightness that he might wish it to bear, (points which he states to be wholly at the discretion of the workman,) he strains a string accordingly on the monochord, and observes with what note it is in unison on a well tuned piano-forte. This note being determined, he sounds the next note above on the same piano-forte, and moves the shifting bridge of the monocord until it is brought in unison. In this manner he proceeds till all the notes of one octave are ascertained and marked. Then he transcribes those marks on a rod, and for all the corresponding notes required upward, halves the several lengths to produce the notes of another octave, and so on, halving from the last octave for as many octaves as the instrument is designed to produce.

For the *covered* strings, he fixes the length of the longest covered string, and draws a line from it to the end of the longest *plain* string, by which is ascertained the respective lengths of all the intervening covered strings.

It is then necessary to observe the weight that brings the longest plain string to its proper tension, and with this weight all the covered strings are to be distended, for the purpose of ascertaining how to increase or diminish the size of the covered strings, until the weight brings every string respectively to the required note.

A few of the first covered strings, will necessarily be open spun, but close spinning is to be taken as soon as possible, which will depend entirely upon the fineness of the covering wire.

The scale thus produced must be strung throughout with the same size wire; it may be varied in different instruments, but not in any case in the same, as two sizes of wire would completely destroy the quality of the tension.

If we do not mistake the intention of the patentee, there are many objections to such a construction. We have no doubt, if it can ever be brought into use, that the uncovered wires, being all of one size, will give a bad tone to the upper part of the instrument. Stretching them by weights is highly objectionable, as Mr. Benjamin Martin found by experience; and as the wires must be made to bear upon the bridge, the friction upon it will prevent the tension of the wire from being uniform when lengthening by heat or contracting by cold. The difficulty also of procuring wires all of one size, will be another objection; nor will it be easy to find the length of the wires with sufficient exactness by the method proposed; but so little is said by the patentee of his method of applying the weights and other parts of his invention and design, that we are prevented from giving so decided an opinion as we wish to do.

Inrolled, July, 1820.

To Samuel Lambert, *of Prince's Street, Leicester Square, London, for an Invention of an Improved Water Wheel, applicable to Mills and Navigable Bodies; and for other improvements also applicable to Mills and Navigable Bodies.*

The first improvement consists in the peculiar construction of under-shot water-wheels, or paddle-wheels, for navigating boats and barges, which are so contrived that, as the wheels revolve, their float-boards or paddles are carried round in a perpendicular position instead of radiating from the centre, as in the common water-wheels. The advantage of this contrivance is considered to be, that, as the float-board or paddles dip into the water and rise out of it with their faces at right angles to the level of the water, a more effective and longer horizontal stroke is obtained than by radiant float-boards or paddles upon a wheel of equal diameter; besides which, the impending resistance of the water, both upwards and downwards, against the radiant float-boards or paddles of an ordinary water-wheel as they pass into and out of the water, is, by the improved wheel, entirely removed.

The patentee does not claim any merit or originality merely in the accomplishment of the above object, but in the particular mode of effecting it.

Plate XIV. fig. 1, represents a side view of the improved water-wheel, in which *a, a, a, a, a, a,* are six arms or spokes, from the shaft or axle *b*, and *c, c, c, c, c, c,* is a ring or hoop independent of the arms or spokes hanging excentric to the shaft *b*, and guides between the pulleys *d, d,* in a lateral direction; *e, e, e, e, e, e,* are six float-boards or paddles, each hanging upon two pivots, their upper pivots attach them to the arms *a*, and their lower pivots to the ring, *c*, by which last-mentioned pivots the ring, *c*, is upheld. If a moving power be applied to the shaft, *b*, of the wheel, as in the steam-boat, the arms, *a, a,* &c. will revolve, carrying the float-boards or paddles, which being also attached by the lower pivots to the ring, *c*, will lift that round at the same time; but the ring, by its natural gravity, hangs below, and revolves in the situation of the circle there shewn, excentric to the moving axle or shaft of the wheel, and is guided, as above described, between the pulleys, *d, d.* By this mode of suspension the float-boards or paddles are retained in a perpendicular position during the entire revolution of the axle, and consequently they pass through the water with a perfectly horizontal stroke, and always preserve their parallelism.

Thus far the improvement is described as applicable to propelling vessels; but the same construction is applicable also to a water-wheel, as the first mover of mill work or other machinery; in which case, the force of a stream of water acting against the float-boards will impel the wheel round in a reverse direction to that of the steam-boat, the parallelism of the float-boards being retained by the two connecting pivots at *a*, and *e*, as above described.

When this contrivance is adapted to a water-wheel for turning machinery, the patentee further suggests, that, under some circumstances, it may be found very desirable to place cogs or teeth upon the periphery of the ring, *c*, which are to act into spur-wheels in place of the pullies, *d, d*, and cause them to revolve as the movers of other machinery attached to their axles.

The second part of the invention consists in the adaptation of a trough, in which the acting part of the wheel works, the object of which is, to take off the effect of tail water. This trough is proposed to be formed something like a boat, but round at the head, and wedge-shaped behind; its upper surface to be level with the surface of the water, and boarded over, except at the opening through which the paddles or float-boards of the wheel pass into the trough. The water-way of the trough, when applied to steam-boats, is to be open in front *f*, and at the hinder part of the top, *g*, but closed on the under [illegible] for the purpose of guiding the water under the [illegible] and of obtaining a more effective stroke. The [illegible], when adapted to water-mills, is to be open in front, and closed at the upper surface behind, g, in order to prevent the rising of the tail-water, which is to pass away through the open lower side, h, of the wedge-formed trough. These troughs may be also usefully employed in connection with the sides of steam-boats, by assisting the buoyancy of such vessels.

The first part of these suggested improvements is not, in its prominent features, new, though possessing ingenuity and novelty in some of the modifications of its parts. We are much mistaken if a similar mode of preserving the parallelism of the float-boards of water-wheels is not already the subject of [illegible], and which effect, when produced, [illegible] realize those advantages [illegible] promised in theory. The second [illegible] suggested for the purpose of [illegible] back-water or tail-water upon [illegible] full and clear manner [illegible] opinion of its [illegible]

[illegible] June, 1820.

To Edward Coleman, Professor of the Veterinary College, St. Pancras, Middlesex, for a new and improved Form of Construction for Shoes for Horses; which [illegible] he believes will be found of great benefit and advantage.

The improvement proposed in this patent is intended to [illegible] contracted feet, contracted frogs, flat soles, corns, sand-cracks, thrushes, canker, and quittors; and also to prevent cutting.

The patentee observes that the fore-feet of horses, in their natural state, are nearly circular, but from the ordinary shoe usually worn in this country, which lifts the frog up from the ground, the hoofs of horses with light fore-quarters are generally found to be more or less contracted and unsound, and this in proportion as the frogs are elevated and support little weight; from which it appears that a principal cause of the above diseases may be traced to the use of a shoe which elevates the frog too much from the ground, and deprives it of its natural and necessary pressure.

To remedy this defect, and to afford the necessary expansion and support to the hoof, the patentee proposes the following forms, observing that no specific form of shoe can be suited to all horses under all circumstances and to every sort of road, it being frequently necessary to alter the shoes of the same horse at different periods.

The construction of the proposed shoe will be seen in Plate XIV. figs. 4, 5, 6; *a*, is a bar of iron down the middle of the shoe called the frog-bar, made broader than the frog, and welded to the shoe; the form and thickness of its hinder part must be regulated according to circumstances, and the heels turned up with two calkins, to prevent slipping. This bar, when the cleft of the frog is diseased, must be slit open in the middle, as shown; but when the frogs are sound this division is unnecessary.

The bar at the hinder part should slightly touch the heels of the frog, and if it should break off from the shoe can produce no mischief.

When the ground is dry, the crust and sole strong, and the heels of the hoof high, the shoe should be made about an inch shorter than common shoes, as fig. 6, with the hinder parts bevelled; but the heels of the frog-bar for contracted hoofs should not exceed the level of the heels of the crust or shoe: for the hinder part of the heel of the crust being exposed, and receiving no pressure from the shoe, will expand into its natural and healthy form. The patentee considers that this shoe will be found particularly useful when horses are turned to grass or at straw-yard; but, in all cases, he directs that shoes should be removed, at least, once a month.

The frog-shoe, with calkins to the heels of the frog-bar, will not only answer the purpose of ordinary frost-shoes, both for the hind and fore-feet, but frequently prevent the disease of quittors, with which heavy draught horses are so frequently afflicted in winter. Corns, sand-cracks, thrushes, and canker, will also be in a great measure prevented or relieved by the occasional use of this shoe, observing that the calkins of the frog-bar and the heels of the shoe should be regulated in their thickness to existing circumstances.

To judge accurately of the advantages of this improved horse-shoe requires considerable experience. Mr. Bracy Clark has invented an *expanding* horse-shoe, apparently actuated by similar views with the patentee: but as upon the theory of these inventions "*Doctors disagree,*" experience alone must decide. We understand that His Royal Highness the Commander in Chief has ordered the experimental employment of this patent shoe in several of the cavalry regiments.

Inrolled, June, 1820.

To SAMUEL PARKER, *of Argyle Street, London, for an Improved Lamp.*

THE patentee denominates this improvement THE SI-

NUMBRA LAMP, from the peculiar construction of its reflector and glass cover, or distributor, which reflect and refract the rays of light, so that no shadow is projected from the circular oil reservoir in any direction. The unpleasant effect produced by the French and Argand lamp, (now generally used for the dinner-table, by the broad shadow, which is cast below, and also upon a level with the faces of the company,) appears to have been the first object of the inventor by his improvement, to remove; and which he states is fully accomplished by the peculiar construction of the glass cover and the reflector.

Plate. XIV. fig. 7, exhibits the lamp and section of the circular oil reservoir, and glass cover, in which *a* is a burner surrounded by a glass chimney upon the Argand principle; *b b*, is the circular oil reservoir, the upper and under surfaces of which subtend an angle, meeting in a point about the centre of the flame; by which form of the oil reservoir the smallest quantity of light is intercepted; *c*, is a small conical metal reflector, with slight springs, in order to slide it up or down upon the glass chimney, and bring it to coincide with the direction of the angle formed by the upper and under surface of the oil reservoir. *d, d*, is the glass cover or distributor of a vase-shape frosted on the inner surface.

The rays of light projected from the burner, striking against the inner surface of the glass cover, *d*, are refracted, by the peculiar form of the glass, in the direction of the rays shewn in the plate; and the rays of light which strike upon the under side of the conical reflector, *c*, are reflected, and some of them refracted also by the glass cover, so as to cross the rays before described at a short distance beyond the ring of the oil reservoir, by these means destroying or wholly dispersing the shadow.

The inner surface of the glass cover or distributor is described as frosted or starred with small polished surfaces, by which the rays of light that fall upon it are refracted and distributed as above described, producing a sort of softness in the light which it emits without detracting from its brilliancy.

This improvement is founded upon philosophic principles, and appears to possess the advantage of perfectly dispersing the shadow of the oil reservoir, as well as of producing an agreeable and uniform light.

Inrolled, August, 1820.

To GEORGE SHOOBRIDGE, *of Houndsditch, London, and* WILLIAM SHOOBRIDGE, *of Marden, Kent, for a Substitute for Flax or Hemp, and for Manufacturing the same for all purposes for which Flax or Hemp are used.*

THE material, proposed to be used as a substitute for flax or hemp, is a certain fibrous substance found in the stalk of the hop-plant; the discovery of its existing in that plant is not the subject of the present patent; but the manner of preparing the same, so as to bring it to the quality of flax, and by such means to render it a useful substitute for that article. The patentee divides his process into eight heads, as follows: first, the hop-binds are to be gathered and tied up in loose bundles of any convenient quantity, and cut into lengths of about four feet, for the greater convenience of operation. In this state they are to be soaked either in ponds, cisterns, or running streams of water, for about eight or ten days if the hop-binds are fresh gathered; but if not, they will require longer time, as two or three weeks. Secondly, when the bands are sufficiently soaked, they are to be removed from such ponds, &c. and immersed in hot-water, by which the fibres will be separated from the pith and core of the plant; the time required depending also upon the effect of the previous soaking. Thirdly, upon wooden benches or rails a number of pieces of iron are to be fixed, standing up as two nails driven in the form of the letter V, which pieces of iron are called strippers; and the bands, in small handfuls, are to be let fall upon these strippers, and drawn through by hand, so as to scrape or strip off the fibrous parts, which roll up into balls or lumps at the hinder part of the strippers. Fourthly, these balls or lumps of the fibrous substance are to be carefully opened and spread out in lengths by children, so as to prevent the fibres from tangling; and in this smooth state they are to remain till dry. Fifthly, the flax produced as above is to be well washed or rinsed, for the purpose of taking out the vegetable gluten, as well as colouring matter, which are found in the fibres. Sixthly, the flax is then to be dried again, by spreading it upon the ground and exposing it to the sun and air; or if the ground be not sufficiently dry, it may be laid out upon hurdles, or, in wet weather, dried upon kilns; which, however, is not so desirable as the open air, because the latter will more readily assist its bleaching. Seventhly, when perfectly dry, the flax, as above prepared, is to be beaten with a mallet or rods, so as to break off any woody particles which may adhere, and when it has been well shaken so as to be free from them, the fibres are to be hackled in the usual manner. Lastly, if the lengths of flax for the purpose of any particular mode of spinning, are required to be greater than about four feet, as above described, (which is considered to be most convenient for operating with in general,) the hop-binds of any, or their whole length, may be stripped or peeled off from the core by hand, and afterwards prepared as above directed.

We are at a loss to know how these gentlemen can be entitled to a patent for manufacturing hop-bines into a substitute for hemp or flax. A paper was published in the Transactions of the Society of Arts some years since, written by the Rev. JAMES HALL, of Walthamstow, which contains, it appears to us, the essence of this patent. To this paper our readers will, therefore, be pleased to refer; or the substance of the paper may be seen in the PANTOLOGIA, under the article *Nettle Thread.*

Inrolled, August, 1820.

To JOHN HUDSWELL, *of Addle Street, London, for an Improvement in the Manufacture of Wafers.*

THIS improvement consists in the application of pressure to the wafer-sheet after it is made, previous to its being cut into wafers; the object of which is, to compress the spongy paste and render the wafer thin, without reducing its actual substance, or depriving it of any of its adhesive qualities. The defect in all wafers heretofore made, appears to be, that their interior is extremely porous, and, after a letter has been sealed with a spongy wafer, the application of steam will so considerably soften the porous part within, as to allow its separation in the middle, though the two surfaces of the wafer may still adhere firmly to the paper; by these means many letters have been opened and again closed, and their contents discovered or plundered without detection, or any external appearance of violation. The process of wafer-making is very simple: the batter being mixed and coloured, is spread between two polished plates of metal over a fire, by which the wafer-sheet is partially baked on its surface, but the steam within has no means of escaping, and therefore expands the interior of the wafer, and leaves it porous or spongy: the defect before described. After the wafer-sheets are made as above, the patentee damps them, and places each sheet between two plates of polished copper, as the most suitable material; these are piled upon one another until a considerable heap is raised, and then the whole pile is submitted to a pressure of three or four tons under a screw press for several hours, by which the wafer is compressed into less than half its former thickness; its sponginess is removed, and, when cut into form, produces wafers which are extremely fine, firm, and compact, with so strong an adhesive property as to render it totally impossible to separate the substance of the wafer itself, or disunite it from the paper.

We have seen some of these patent wafers, and decidedly prefer them to any other which we have before used.

Inrolled, September, 1820.

To JONATHAN BROWNILL, *of Sheffield, Yorkshire, for a Method of better securing the Blades of Table-knives and Forks in Handles, by means of caps being soldered upon the Tangs, whether of Iron or Steel, or other material, after the handles are put upon them.*

THE patentee's method of securing the handles upon table-knives and forks, is, by lengthening the tangs, so as to pass them completely through the handle, the ends of which are to be tinned after the ordinary mode of tinning iron; and, when passed through the handle, the end of the tang is to be spread by beating, or a small hole drilled through it, and a pin passed to hold it upon the handle. After this, caps of metal, either copper plated, or silver, are to be soldered on to the projecting end of the tang, and, while the solder is in a fluid state, the cap is to be pressed upon the end of the handle and held there until the solder is fixed, when the whole is to be cooled by being immersed in cold water.

Inrolled, August, 1820.

To JOHN BUTLER LODGE, *and* JOHN BITTLESTON, JUN *both of the Strand, London, for certain Inprovements in the construction and application of Spring Trusses or Bandages for the relief and cure of Hernia.*

THE improvements proposed in this patent consist of a spring or springs, formed as, Fig. 8. Plate XIV. which the patentees denominate a reverting spring truss, differing from all other trusses, by the spring producing no pressure upon the spine, hips, or any part of the back. The inconvenience arising from the general construction of springs, applied as the support of the truss-pad, appears to be, that considerable irritation is produced by the pressure of the springs against the back as a resistance, which to some patients is found insufferably painful. The object of the present construction is to dispense with this resisting pressure altogether, and to produce the requisite force of the pad against the diseased part by the reverting action of the spring. Suppose the ellipsis drawn by the plain line in the above figure to represent the trunk, and the dotted ellipsis to describe the bandage passing round the trunk to draw the spring out of its natural reverted figure into an inverted figure; it will then be seen that all the power exerted by the spring, in endeavouring to recover its former position, will be thrown against the trunk; and as the truss-pads are placed in the most powerful part of the spring's action, they will be pressed against the trunk at the diseased part, to which they are previously adjusted, and the full effect will be produced with much more ease to the patient than by any other mode of effecting that object.

It is frequently difficult properly to appreciate the merits of an apparatus designed to relieve or correct bodily disease or deformity; but, as far as the patentee's intentions go, the advantages appear self-evident, and considering the innumerable cases of hernia and its lamentable consequences, humanity alone would induce us to approve every practicable attempt for its relief.

Inrolled, August, 1820.

To Abr. Henry Chambers, *Esq. of New Bond Street, for an Improvement in preparing or manufacturing Substances for the Formation of Highways and other Roads, and which Substances, when so prepared, are applicable to other useful Purposes.*

The materials proposed in this patent, for the formation of roads, are, vitrified clay, loam, marl, or any other earth that will not fall to powder, or burn to lime; which is intended to be burnt in a temporary kiln erected by the side of the road about to be made or repaired. These materials are not designed to supersede the use of stone, gravel, or other hard substances, when it can be readily procured at small expence, but as a good and sufficient substitute in clayey soils, or where gravel and other hard materials are not at hand. The patentee directs trenches to be dug by the road side, in order to drain them; and of the earth so obtained, when dried and burnt, he proposes to construct the road. The temporary kilns for burning the earth, are to be made at about ten poles apart, so as to avoid as much as possible the trouble and expense of cartage. The kilns are to be of about six yards in width, and of any length; in these kilns a stratum of the dried earth is laid of about two feet in thickness, between two layers of combustibles, so as to turn to a vitrified state the greater portion of the earth so enclosed. The principal part of the contents of the kiln will then be in lumps, which are to be separated from the dust or powder; and such vegetable matter as produces alkali may be burnt with the other materials, to assist the vitrification: salt, barilla, potash, or soap-ashes also, if they can be procured at a small expence, may be employed for the same purpose. The dust unavoidably produced, or remaining from the above described burning of clay, &c. having been separated from the vitrified matter, is first employed to damp or extinguish the fire, and afterwards, though not applicable to road-making, becomes a valuable material, and may be appropriated for dressing lnad.

The modes of using the before described materials, are, by the patentee, divided into seven applications— First, in the construction of the road, the basis of which is to be a layer of the hardest of the above pieces, from four to six inches square, upon which are laid smaller pieces so as to fill up the interstices, and having rammed them hard, the whole is to be grouted with hot lime and water, so as to form a hard terrace, raised in the middle with channels along the road a few inches under its surface, for the purpose of underdraining, as described in the following head. Secondly, the above vitrified materials are employed in land draining, or under draining, for the purpose of occupying the trenches, and leaving them sufficiently porous to admit the subsiding waters without being absorbed. Thirdly, in constructing garden walks of the same materials. Fourthly, in applying the same to the floors of barns and other farm buildings, by which the burrowing of rats is prevented. Fifthly, the same is applied to the formation of beddings for the paving stones of streets, &c. Sixthly, in appropriating the same to the formation of walls; and seventhly, for the making of a sort of material, similar to Pozzolano mortar, for cementing buildings under water.

It appears to us that the above process may be useful upon clayey or boggy lands, but for general use it would certainly be found too expensive to be adopted. And even on clayey soils, unless fuel can be obtained cheap, while at the same time stones are exceedingly dear, from their distance and expensive carriage, the burning of clay for the repair of roads cannot we fear be adopted. The suggestions, however, in this patent are worthy of attention. The patentee has also published a short tract on the formation and condition of the roads, and although we cannot assent to all his statements, it contains many observations well worthy the attention of road-makers. We may probably notice this tract in some future number more at large.

Inrolled, September, 1820.

To JOHN HAGUE, *of Great Pearl Street, Spital-Fields, London, for certain Improvements in the making and constructing Steam Engines.*

THE proposed improvements of this patent, apply to the construction of a simple *Rotatory Engine*, to be worked either by high or low pressure steam. The apparatus, in appearance, very much resembles a chain pump, particularly that construction described in the specification of G. Tyer's patent, July, 1818; the parts are as follows: there is an endless chain, carrying buckets or pistons, which is distended over two cog-wheels, having recesses in their periphery for the buckets or pistons to fall into, and the cogs of the wheels take into the links of the chains for the purpose of carrying it round.

The cases of the apparatus consist of two boxes, placed one above, the other below, connected together by two pipes or cylinders standing vertically. One of the above-mentioned cog-wheels is placed in the upper box, the other in the lower, and the endless chain and buckets or pistons pass down the pipes or cylinders and over the wheels. The lower box is to be filled with a quantity of mercury, or other non-elastic fluid, up to the eduction or condensing pipe, which is at the bottom of the working cylinder, viz. one of the vertical cylinders or pipes before-mentioned.

The action of the engine will be seen by the following description: let steam of the low pressure be admitted at the upper part of the working cylinder from a boiler in the ordinary way, and it will entirely fill this case of the machinery, excepting that part of the working cylinder which is between the bucket or piston at that time in the upper part of the cylinder and the mercury below. The steam, by its expansive force, will then drive the bucket down the cylinder until it reaches the eduction or condensing pipe; before which time another bucket has entered the top of the working cylinder above. The columns of steam between the buckets then become condensed by the opening of the eduction passage; and a partial vacuum is produced, while the steam above presses down the second bucket or piston until a third has entered the working cylinder, and the steam, occupying the space between the second and third, becomes condensed as before, and so on; the buckets sinking through the mercury and up the other pipe, by which a continued rotatory action is obtained and communicated from the axle of the cog-wheel, and regulated by a fly-wheel.

When this engine is worked by high pressure, the steam must be admitted at the lower part of the working cylinder, and the machinery will act the reverse way or upward. The steam's expansive force, resisted by the mercury below, raises the pistons or buckets, and is then condensed or discharged into the atmosphere at the top of the working cylinder.

Inrolled, August, 1820.

To ROBERT BILL, *Esq. of Newman Street, London, for an improved Mode of constructing Beams, Masts, Yards, Bowsprits, and other parts of Ships, Vessels, and Craft, and for the Purposes of Navigation, and of other parts of the Rigging of Ships, Vessels, and Craft.*

THE patentee proposes to construct his Beams, Masts, Yards, and Bowsprits, of sheet iron, or plates of wrought iron, rivetted into tubes or cylinders in a manner similar to the iron tubes or chimneys of German and other close stoves. The thickness of the sheets of iron must depend upon the size of the mast to be constructed, and their junctions, or the attachment of one cylinder to the other, is to be made by means of cast iron sockets rivetted, and also secured by means of iron hoops on the outside of the mast; or they may be attached by means of iron crosses within the mast, with claw ends to receive bolts or rivets, observing that it is essential to have the interior of the mast hollow throughout, so as to admit of the free passage of air. It is further proposed, that there should be openings at the lower parts of these hollow masts, which are below deck, in order to assist in ventilating the ship.

The improvement proposed in the "other parts of the rigging of such ships," &c. consists in anointing the ropes with a composition of three parts mineral tar and one part raw turpentine, melted and mixed together to about the consistency of pitch. This composition may, for cables, be softened with a quantity of oil, incorporated with the other ingredients.

Inrolled, July, 1820.

Original Communications.

On the proposed Alteration in the Laws relative to Patents.

Two Bills are now pending before Parliament, for altering the existing laws relative to patents, the objects of which are dissimilar; but as they both contain clauses, that, if enacted, must considerably affect the progress of invention, we deem it our duty to lay the substance of their contents before our readers, accompanied with such remarks as appear upon the occasion necessary.

The title of the first is, "*A Bill for the protection of Persons applying for Patents for Inventions.*" The preamble recites, that the laws relating to patents for inventions, render such property so uncertain and insecure, that many persons are deterred from taking out patents upon these grounds. That, as inventors are seldom men of capital, it would tend greatly to encourage the arts, if letters patent were granted for communications received from persons resident in this land, with consent of the original inventor; and that it would tend greatly to promote the advancement of arts, sciences, and manufactures, if the laws were so regulated as better to protect patentees from piracy, during the progress of experiment; to prevent the infringement of one inventor upon another's rights; and more effectually to secure to the public a perfect specification of each invention, and to the patentee's pecuniary advantage.

The second is entitled, "*A Bill to prevent the inconvenience arising from the facility of procuring copies of specifications enrolled by grantees of Letters Patent, for the sole working and vending of new manufactures within this realm.*" This recites, that great loss and damage have been sustained by patentees, from the facility of inspecting specifications of unexpired patents, and from the printing and publishing of such specifications shortly after they have been enrolled, by which valuable discoveries have come to the knowledge of foreigners. Hence the advantages of patentees are anticipated abroad, and other countries are enabled to improve their manufactures before the same advantages can be extended legally to the subjects of this realm.

In the first bill it is proposed, that commissioners of patents shall be appointed, (the number not stated) consisting of civil engineers, practical mechanics, chemists, and others of known science and education, not being in any trade or business, to be appointed by the Lord Chancellor, &c.

With respect to the appointment of commissioners we should object *in toto*. Is there any man in business, looking at the modes of conducting commissions of bankruptcy, that would approve of a set of commissioners so constituted? What have the Bank Note Commissioners effected in the course of several years labour, though some of them are really men of the first talent? What is to remunerate such persons for their labours? And how are they to be competent practical men if out of business? In short, if all these objections were groundless, where are the men, with such unbiassed principles, such disinterested feelings, and such profound science and knowledge, as to be able to act impartially, and to judge fully of every branch of the arts, sciences, and manufactures.

The commissioners being appointed, it is to be enacted, that whenever an inventor (intending to solicit letters patent) thinks he has conceived the plan of any new invention, although he may not have proved it, he is to come before this sapient assembly and explain his views or ideas, and they are to determine the correctness of his plans and their advantages; when "if it shall appear to such commissioners, that the plan of such invention is fit and proper to be carried into execution," they shall register the particulars of the same, and grant to the inventor a warrant of experiment, with protection to make and perfect his invention previous to petitioning his Majesty for a patent, and that his claim of originality be dated from the grant of such warrant. So far, this proceeding, if practicable, might be, under some circumstances, advantageous; but is the poor inventor to pay the expenses of the examination? And if it should perchance happen that the said invention be not thought worthy of a patent, (a matter, by the way, which sometimes no man is so competent to judge of as the person from whom it emanates,) are these commissioners to be armed with the arbitrary power of refusing it? This, however correct, would certainly be considered oppressive by every aerial castle building theorist with a perpetual notion in his head, or the philosopher's stone at his fingers' ends, who, if thus

> "convinced against his will,
> Is of the same opinion still."

Should the commissioners feel incompetent themselves to decide, they are to call witnesses as to the merit or originality of the matter, upon oath. If we revert to the past, it is in every one's recollection that a large assemblage of our principal mechanics (upon the case of Heathcote *v.* Brown's machinery for making lace) were pitted against each other, with opinions as opposite as the antipodes: one party could not discover in the specification sufficient explanation to understand the machine's construction, while the opposite party could find all and every part of it minutely and accurately described. Again, one set of persons said, that the second machine was exactly copied from the first, while others maintained, that there was not the smallest similarity between them. Nor are such conflicting deductions confined to mechanics alone: we hear at the present moment, from the first professors of chemistry of the day, the most irreconcileable assertions: one party asserting that oil by positive experiment is volatilized and converted into gas at a temperature of 300° or thereabouts, while the opponents by the same test cannot procure it below twice that height of the thermometer.

Turning again to the bill, it is further to be enacted, that, at the expiration of the term of the aforesaid warrant, the inventor (if petitioning for letters patent) is to produce the results of his experiments to the assembled commission, and upon the same corresponding with the statement before given, he is to receive a certificate, and his patent be allowed to proceed. Now it must be evident, that if his ideas and plans were matured, no experiment would be necessary; and if not matured, in all probability the method at length by which the object becomes (if ever) effected, will be totally dissimilar to the mode first suggested by the inventor. How then would it correspond with the register?

The next clause provides, that the specification of the invention shall be prepared at or before the period of the expiration of the licence, and delivered to the said commissioners for their examination and approval; which, having passed this ordeal, shall be pleaded in bar of any future action against the patentee, upon the grounds of fault or defect in the specification.

Now, considering the frequent length and abstruseness of many inventors' descriptions, this would be a laborious exertion of the mind, which no commission could possibly devote the time and patience to perform; of consequence the intention becomes defeated, and the specification would be frequently enrolled in the same prolix or defective manner as at present. There is then a clause providing that, in the event of the specification proving to be erroneous and deficient, the patentee shall be allowed to amend it any time after its enrolment. This would open a wide field for chicanery, it being soon discovered that commissioners neither took the trouble to know or cared any thing about the matter. From which circumstance, before a patentee could be compelled to lodge a correct description of his invention, it would be necessary for some indifferent individual to institute an action upon the defects of this specification, and, with the seal of the commissioners' approbation already upon it, [perhaps no mode could be adopted of procuring a just specification at all.

It is then to be enacted that copies of specifications shall be granted, only by especial application in court, when, if no objection arise from an opposing party, the request shall be granted by a judge's order, which copy is to be charged with a stamp duty of * * *

It frequently happens that patents are granted for important improvements upon former patents: now it is utterly impossible that persons residing at a distant part of the kingdom, can be made perfectly acquainted with the subject matter of a previously granted patent, unless he is allowed to possess a copy; hence such a prohibition would tend only to cripple the progress of improvement, or lead an artist ignorantly to the infringement of another's rights. If the concealment of the patent is intended, its specification should be shut up altogether from public observation, as the merits of nine inventions out of ten may, by perusal of the specification, be brought awayin the recollection of a person acquainted with similar subjects; but this concealment would be still worse for the progress of science, as the broad subject of the invention would be publicly sold, and the collateral claims of the patentee not discovered until some other person had, by labour and expense, accomplished an object which was already in the first inventor's contemplation. The vast expense of stamp-duty, as well as of law process, is not altogether unworthy of remark, and we do not see any useful object likely to be accomplished at last.

There is a clause enabling persons who have, *bonâ fide*, purchased an invention from its author, upon an affidavit, to obtain letters patent for the same. The last active clause is to allow appeals against the decision of the commissioners in a court of law: that is, to overturn all that the commissioners have been authorized to determine, and proceed to trial upon the merits of the specification, as heretofore; but not without a very circuitous and ruinously expensive process of law. The remaining clauses refer to the modes by which commissioners are to be paid for their trouble in the different stages of the business. Of the stamp duties to be attached to the respective documents, of the fees of clerks, &c. attending upon the commissioner, or keeping the book of the expenses of rooms, &c. where these attendances are held, and other incidental charges which might accrue.

The second bill proposes, that the specification of a patent, being prepared as heretofore within a certain time stated in a providing clause of the patent, shall be then produced to certain persons or commissioners appointed* for that purpose; and the process of making and using such new patent invention shall be performed, or described by models or the machine itself, before such commissioners, who, upon certifying that the same process is new and fully described by the specification, as to the best of their knowledge and belief, shall then direct that the said specification be enrolled. It does not appear, in the event of the specification proving unsatisfactory to the commissioners, how the patentee is to proceed, as the whole expense of the patent has been previously paid, and the peremptory time allowed for specifying will be then upon the eve of expiration. Are the commissioners authorized to extend the period directed in the grant of letters patent, in order to allow the inventor time to amend his description, or make further experiments? If so, an adventurer, obtaining letters patent under the ambiguous title of "*Certain improvements in the making or fabrication of sundry tools or articles, to be used in various arts and manufactures, or the ordinary occasions of life,*"* might go on procrastinating his specification, without satisfying the commissioners, until he had picked up something useful, or exhausted the whole term of his patent.

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* We understand two persons are to be appointed as Commissioners; and we are not ignorant of certain honourable and gentlemen amateurs in the arts to whom these sinecures would be extremely convenient. Nay, it has been hinted, from peculiar expressions in the bill, that expectation already stands on tiptoe in the immediate presence of Royalty.

It is further to be enacted, that the said commissioned persons shall be previously sworn before a Master in Chancery, to examine and decide truly, to the best of their judgment, upon the matter before them, and to certify accordingly, and keep the same invention secret until the expiration of the patent, unless called upon to give evidence upon the subject before the Lord Chancellor, or in a court of law. The impropriety of this measure we have before considered, as well as the incompetency of any man to fill such an office.

It is next proposed, that the specification, when approved, shall be sealed up and delivered to a proper officer, to be kept concealed and in his close custody, unless called upon to exhibit the same before the Lord Chancellor or Judges upon a trial at law, or in the event of an application for letters patent, which it may be apprehended will interfere with the former. Query, has the Lord Chancellor or the Attorney General time or opportunity to suggest any such apprehension out of the multiplicity of patents, which are annually sealed, and particularly with the ambiguous titles under which many are cloaked? It is then, upon the trial, for the first time to be discovered, that another patentee, after great labour and expense, had made the same discovery or invention, for which a patent was already in existence, and of which the latter inventor very properly considered himself to be the parent, until by this action he is deprived of the fruits of his honest exertions, and saddled with such expenses as will prove his ultimate ruin.

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* Granted to R. Dickenson, Esq. of Great Queen-street, Lincoln's Inn Fields. Sealed Feb. 1815, but never specified.

It is further to be enacted, that the officer of inrolment shall keep a register of the dates, with the objects, of every patent for public inspection, and that he shall give notice to every such patentees, of any petition being presented for the grant of a patent, for an object professing to be of the same nature as his own. Numerous are the objections to this clause, arising principally out of the ambiguity of titles before noticed: for instance; if an inventor solicits a patent for a *new method of producing Bank Note Plates*, is it probable, that in the course of his duty, the officer of inrolment, whose business is with the law, not with the arts, should know that a patent for "*an improved mode of combining and inlaying metals, or other hard substances, applicable to various useful purposes*,"* should be designed precisely for the same purpose. The next clause to prevent infringement, proposes nearly the same process of petitioning the law officers of the crown, as already practised in the case of caveats, under which circumstances the commissioners above appointed, shall be directed to examine certain specifications, in order to discover whether any and what similarity exists between the plans of the former patentee and the present petitioner; the charges and expenses of such research to be levied by the Attorney-General upon the parties petitioning, and to be considered as a just debt, and recoverable by action at law.

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* Granted to Sir W. Congreve, Bart. (see page 241.)

It is then to be enacted, that when letters patent are granted for Scotland or Ireland, that sealed copies of the specification, as above, shall be delivered to the proper officer in the respective places, to be by them kept in close and secret custody until the expiration of the patent, as in England, and that the same may be opened and examined by proper persons in Scotland or Ireland, under circumstances and for similar purposes as above directed, and a register of patents kept, with every other proviso, as before stated.

This is the substance of the proposed laws, and the above are among the numerous objections which obtrude themselves upon us. We, therefore, have entered rather largely into the subject, considering it our duty to awaken the attention of those whom it most materially concerns, and, if possible, to prevent the enactment of laws that have every appearance of being a mere *job*. To bring genius and talent to the ordeal of a secret tribunal is neither consistent with English habits nor English inclinations; and, although we are free to confess that something might be done relative to the law of patents, which may be advantageous both to the public and to ingenious individuals, yet a secret inquisition is not that something which we want; and which, if carried into effect, must produce the most baneful consequences to the arts, sciences, and manufactures, and serious injury to the public, by placing a complete extinguisher upon the art and ingenuity of man. So far from thinking secresy good upon the subject of patents, we think that if every patentee were obliged to publish the particulars of his invention in the Gazette before he obtained a protecting license, the public would be materially benefitted by it. Such publication would produce enquiry, from which no honest patentee would shrink, and by which the fraudulent patentee would be most certainly detected and exposed.

On the Inflammability of Fixed Oils.

As we hinted in our paper, page 188, relative to the *volatility* and *inflammability* of fixed oils, the attention of scientific persons has been turned to this subject.

At a meeting of the City Philosophical Society* on the 23rd of August, Mr. Tatum made some observations and experiments which tend to its further elucidation.

Relative to the different results, as mentioned on the trial of *Severn*, *King* and *Co.*, it is admitted that some difference might arise from oil being an imperfect conductor of heat; but such variations would be manifest by placing thermometers in different situation of the vessels of heated oil. A variation of 14° had been observed between two thermometers, the bulb of one being placed at the bottom of the boiler, and that of the other near the surface of the oil; but this difference in temperature was observed before the oil arrived at the boiling point, and appeared incompetent to reconcile the conflicting evidence adduced upon the trial. In order to investigate the subject, and bring it clearly before the society, Mr. T. had constructed an apparatus, represented in Plate XV. consisting of an upper vessel, *a*, capable of containing three pints of oil, supported upon a tripod, with a cap firmly luted down, into which, through a stuffing-box, was introduced a graduated thermometer, *e*, numbered on the stem up to 675°. From the middle of the cap of this oil vessel, which we will call the retort, proceeded a bent tube, *b*, terminating at a short distance below the surface of the water in a hydro-pneumatic trough, *c*. The retort contained about half a pint of common whale oil, of the consistence of thick treacle, from repeated boiling, into which the bulb of the thermometer was introduced, so as nearly to touch the bottom of the vessel, considering that it is the lowest part of the oil, which becomes first decomposed, and hence in that situation the thermometer was best calculated to denote the true temperature of the oil when decomposing. In order to have the heating cause more immediately at command, a large gas burner with a chimney and valve, to regulate the emission of the gas, was brought under the oil vessel. As soon as the thermometer indicated that the oil had risen to the temperature of 380°, two members of the society assisted in the experiment, and noted the progress of the rising mercury in the thermometer, in order that a correct and impartial statement of facts might be taken. Several ebullitions of vapour coming over into the receiver, *d*, a lighted taper was applied, but it did not burn; it appeared to be, simply, the expelled air which had occupied the oil vessel. A new idea advanced upon the trial of explosion without noise was noticed, and considered not to be consistent with the known phenomenon, as explosion is always attended with a noise and force: these effects being the principal features of difference which existed between mere combustion and actual explosion, the former being a gradual and silent chemical combination, while the latter was rapid and reporting.

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* The City Philosophical Society holds its weekly meetings, in Dorset Street, Salisbury Square, where it was instituted in 1808, for the general diffusion of science among its members. They alternately occupy their evenings, (Wednesday,) with experiments and discussions, or lectures delivered to their friends upon the various branches of science and literature. We cannot perhaps better promote the advancement of useful knowledge, than by recommending this flourishing little Institution to the notice of the young *Tyros* of the Metropolis, as a school of science which has already been the nursing parent of several characters of acknowledged talent.

The temperature of the oil having now risen to 590°, as indicated by the thermometer, small ebullitions of a gas, for the first time, came slowly over; when collected in a glass receiver, the temperature continuing to rise, and a lighted taper being applied to the mouth of the receiver, it burned silently to the bottom. Mr. Tatum lamented that the small quantity of gas collected, would not afford him upon that occasion the opportunity of determining (by a new apparatus which he had constructed) the specific gravity of the gas, but he had not met with any carburetted hydrogen or olefiant gas, of equal gravity with atmospheric air; from which it appeared impossible that olefiant gas should descend into the flue into which the steam pipe passed, as stated upon the trial.

The experiment being concluded, and the oil vessel removed from the fire, a member of the society observed, that as oil is an indifferent conductor of heat, perhaps the cold table upon which the bottom of the retort then stood, might have extracted a portion of heat from the lower part of the oil, without considerably affecting the upper portion. The thermometer was then raised through the stuffing box until the bulb touched the surface of the oil, when it immediately indicated a rise of 20°, temperature, and on being again pressed down the mercury fell as before.

From these experiments we are confirmed in our opinions formerly expressed, that the methods of ascertaining the temperature of the oil, by the different witnesses upon the above trial, must have been conducted by different modes, or such dissimilar results could not have been produced. As oil is a bad conductor of heat, when the quantity employed in such experiments is very great, it is easy to conceive how such discrepancies among several experimentalists may arise.

To the Editor of the London Journal of Arts and Sciences.

Mr. Editor,

In the last number of your Journal, in a paper upon the discovery of the supposed Antarctic continent, speaking of the production of ice near the southern polar circle, you observe, that the same degree of frigidity does not take place in the open seas of corresponding latitudes northwardly, nor can any philosophical reason be given for such a phenomenon, unless it be the presence or vicinity of land.

It is possible you overlooked a well known circumstance, which, if it does not account for the whole difference of temperature, cannot but have a very considerable effect towards it. I mean the sun's continuing eight days longer on the northern side of the equator, than on the southern (owing to the elliptical figure of the earth's orbit) and this being repeated every year for so many ages, must produce an accumulation of heat; for it can hardly be supposed, that the earth gives out the whole of the heat it has received in one season, before the next return. Added to that, the earth moves slower in the northern part of its orbit. Whatever difference of opinion may exist, in respect to the quantity of effect, yet it is certain, that it is not true, that no philosophical reason can be given for the phenomenon in question. By whatever quantity the heat is increased in the northern hemisphere, by this circumstance, it is so much diminished in the southern part of the world, so that the difference is double.

I am, yours sincerely,
SAMUEL VARLEY.

[The lateness of this article coming to hand, prevents us from replying to its arguments at present, which, however ingenious, and worthy of consideration, we do not think will account for the phenomenon.]—ED.

Novel Inventions.

Mr. M'ADAM'S *New System of Road-Making.*

A SMALL volume has lately appeared* of considerable importance, and of which it shall be our business in the present paper, to furnish the principal outlines; but as two branches of Mr. M'Adam's subject, viz. *The Commissioners and Officers employed under them* and *the Care of the Finances*, are foreign to our journal, we shall confine ourselves to *the mode of making Roads*, which is confessedly, the most entitled to the attention of the public.

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* Remarks on the present System of Road-making, with observations, deduced from practice and experience, with a view to a revision of the existing laws, and the introduction of improvement in the method of making, repairing and preserving roads, and defending the road funds from misapplication. Third Edition, carefully revised, with considerable additions and an appendix. By John Loudon M'Adam, Esq. general surveyor of the roads in the Bristol district. 8vo. pp. 196.

In the neighbourhood of London, Mr. M'Adam informs us, the roads are formed of gravel; in Essex and Sussex, they are formed of flint; in Wilts, Somerset and Gloucester, limestone is principally used; in the North of England and in Scotland, Whinstone stone is the principal material; and in Shropshire and Staffordshire, large pebbles mixed with sand. Excellent roads may be made with any of these materials.

The gravel of which the roads round London are formed is the worst, because it is mixed with a large portion of clay, and because the component parts of the gravel are round, and want the angular points of contact, by which broken stone unites and forms a solid body; the loose state of the roads near London, is a consequence of this quality in the material, and of the entire neglect or ignorance of the method of amending them. Another great impediment to improvement, arises from the laws and regulations which prevent a supply of good materials of several kinds being brought to London by water, and landed in different places convenient for the roads. Were these restrictions removed, as far as concerns stone, flint, or any ballast for road-making, London is so favourably situated for water carriage, that a supply equal to all the roads in its vicinity might be obtained, and of good quality; so as to render the use of bad gravel no longer necessary. This must not, however, be understood as conveying an opinion, that a good road may not be constructed, with the London gravel properly prepared and applied.

A road near London may be made as smooth, solid and easy for cattle to draw carriages over, as the road near Bristol; and the London road *so made*, will last longer, and consequently be less expensive than the Bristol road, because the materials, which may be obtained are more durable and may be procured at less expense.

Flint makes an excellent road, if due attention be paid to the size. Limestone, when perfectly prepared and applied, makes a smooth solid road, and becomes consolidated sooner than any other material; but from its nature, is not the most lasting. Whinstone stone is the most durable of all materials; and, wherever it is well and judiciously applied, the roads are comparatively good and cheap. The pebbles of Shropshire and Staffordshire, are of a hard substance, and only require a prudent application to be made good road materials. Notwithstanding which the Scottish roads, although made of the best materials, and which in that country, both abundant and cheap, are the most loose, rough, and expensive roads in the United Kingdom, owing to the unskilful use of the material.

The formation of roads is defective in most parts of the country; in particular, the roads round London, are made high, in the middle in the form of a roof, by which means a carriage goes upon a dangerous slope, unless kept in the very centre of the road.*

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* This may be true in some instances: but in numerous others, particularly the wide roads around the metropolis, such, for instance, are those leading in various directions from London southward and eastward to Greenwich, Peckham, Camberwell, Brixton, Clapham, &c. &c.: the fault is, generally, that they are *not high enough* in the middle: we make this remark upon long, accurate and attentive observation.—Editor.

When a road has been originally well made, it will be easily repaired, and Mr. M'Adam has never observed any great difference of effect on a *well made road* by narrow or broad wheels. It must, however, be admitted, that the *wear* of roads is proportioned to the weight and velocity of carriages running upon a given breadth of the tire of the wheels, and therefore it is of consequence, that some regulations should be adopted. Stage coaches, therefore, carrying heavy weights, moving with great velocity, and presenting to the road a narrow tire of wheel, must of necessity drag in a greater degree than any other carriage, as combining in themselves every cause by which dragging is produced.†

Directions for Repair of an old Road, being the Substance of a Communication made to a Committee of the Honourable House of Commons in 1811, *and published with the Report by Order of the House, with additions and alterations, deduced from actual practice during the last three years.*

1st February, 1819.

No addition of materials is to be brought upon a road, unless in any part of it be found that there is not a quantity of clean stone equal to ten inches in thickness.

The stone already in the road is to be loosed up and broken, so as no piece shall exceed six ounces in weight.

The road is then to be laid as flat as possible, a rise of three inches from the centre to the side is sufficient for a road thirty feet wide.

The stones when loosened in the road are to be gathered off by means of a strong heavy rake, with teeth two and a half inches in length, to the side of the road, and there broken, and on no account are stones to be broken *on* the road.

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† Hence from Mr. M'Adam's own argument, it follows that from *this cause alone* the roads near London are subject to MORE WEAR than those in any other part of the Kingdom; and hence, *ceteris paribus*, the greater expense, trouble, and difficulty of keeping them in repair.—EDITOR.

When the great stones have been removed, and none left in the road exceeding six ounces, the road is to be put in shape and a rake employed to smooth the surface, which will at the same time bring to the surface the remaining stone, and will allow the dirt to go down.

When the road is so prepared, the stone that has been broken by the side of the road is then to be carefully spread on it—this is rather a nice operation, and the future quality of the road will greatly depend on the manner in which it is performed. The stone must not be laid on in shovels full, but scattered over the surface, one shovel full following another, and spreading over a considerable space.

Only a small space of road should be lifted at once; five men in a gang should be set to lift it *all across:* two men should continue to pick up and rake off the large stones and to form the road for receiving the broken stone, the other three should break stones—the broken stone to be laid on as soon as the piece of road is prepared to receive it, and then break up another piece; two or three yards at one lift is enough.

The proportioning the work among the five men must of course be regulated by the nature of the road; when there are many very large stones, the three breakers may not be able to keep pace with the two men employed in lifting and forming, and when there are few large stones the contrary may be the case; of all this the Surveyor must judge and direct.

But while it is recommended to lift and relay roads which have been made with large stone, or with large stone mixed with clay, chalk or other mischievous materials, there are many cases in which it would be highly unprofitable to lift and relay a road, even if the materials should have been originally too large.

The road between Cirencester and Bath is made of stone too large in size, but it is of so friable a nature that in lifting it becomes sand: in this case I recommend cutting down the high places, keeping the surface smooth, and gradually wearing out the materials now on the road, and then replacing them with stone of a better quality properly prepared.

In like manner a part of the road in the Bath district is made of freestone, which it would be unprofitable to lift.

At Egham in Surrey, it was necessary to remove the whole road to separate the small portion of valuable materials from the mass of soft matter of which it was principally composed, which was removed at considerable expence, before a road could be again made upon the site.

Other cases of several kinds have occurred where a different method must be adopted, but which it is impossible to specify, and must be met by the practical skill of the officer whose duty it may be to superintend the repair of a road, and who must constantly recur to general principles. These principles are uniform, however much circumstances may differ, and they must form the guide by which his judgment must be always directed.

When additional stone is wanted on a road that has consolidated by use, the old hardened surface of the road is to be loosened with a pick, in order to make the fresh materials unite with the old.

Carriages, whatever be the construction of their wheels, will make ruts in a new made road until it consolidates, however well the materials may be prepared, or however judiciously applied; therefore a careful person must attend for some time after the road is opened for use, to rake in the track made by wheels.

The only proper method of breaking stones, both for effect and economy, is by persons *sitting;* the stones are to be placed in small heaps, and women, boys, or old men past hard labour, must sit down with small hammers and break them, so as none shall exceed six ounces in weight.

The Tools to be used are,—

Strong picks, but short from the handle to the point, for lifting the road.

Small hammers of about one pound weight in the head, the face the size of a new shilling, well steeled, with a short handle.

Rakes with wooden heads, ten inches in length, and iron teeth about two and a half inches in length, very strong for raking out the large stones when the road is broken up, and for keeping the road smooth after being relaid, and while it is consolidating.

Very light broad-mouthed shovels, to spread the broken stone and to form the road.

Every road is to be made of broken stone without mixture of earth, clay, chalk, or any other matter that will imbibe water, and be affected with frost; nothing is to be laid on the clean stone on pretence of *binding;* broken stone will combine by its own angles into a smooth solid surface, that cannot be affected by vicissitudes of weather or diplaced by the action of wheels, which will pass over it without a jolt, and consequently without injury.*

On the Structure of new Roads.

ALL roads of which chalk was a component part, became during the last winter, when the frost was succeeded by a sudden thaw, generally impassable, and even the roads, made over chalk soils, gave way in most places. The use of chalk, therefore, in road-making, is one of the most dangerous errors.

Roads placed upon a hard bottom, wear away more quickly than those upon a soft soil. It is a known fact, that a road lasts much longer over a morass, than when over a rock. The evidence before the Committee of the House of Commons, shewed the comparison on the road, between Bristol and Bridgewater, to be five to one in favour of the wearing on the morass; when the road is laid on the naked surface of the soil, against a part of the same road made over rocky ground.

In making a new road, it should not be sunk below, but rather above the ordinary level of the adjacent ground; care should at any rate be taken, that there be a sufficient fall to take off the water, so that it should be always some inches below the level of the ground upon which the road is intended to be placed: this must be done, either by making drains to lower ground, or if that be not practicable from the nature of the country, then the soil, upon which the road is proposed to be laid, must be raised by addition, so as to be some inches above the level of the water.

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* Mr. M'Adam introduces in his work page, 41, some remarks on the present prices at which stones are broken, and other road-work performed; and he thinks, the reduced expense at which the Bristol roads are now put in repair, is attributable to his better system of management: some of it, no doubt is; but is not the present superabundance of labour, and of course, its low prices, a much more probable and operative cause?—EDITOR.

Having secured the soil from *under* water, the road-maker is next to secure it from rain water, by a solid road, made of clean, dry stone, or flint, so selected, prepared, and laid, as to be perfectly impervious to water: and this cannot be effected, unless the greatest care be taken, that no earth, clay, chalk, or other matter, that will hold and conduct water, be mixed with the broken stone; which must be so prepared and laid, as to unite by its own angles into a firm, compact, impenetrable body.

The thickness of such road is immaterial, as to its strength for carrying weight; this object is already obtained by providing a dry surface, over which the road is to be placed as a covering, or roof, to preserve it in that state: experience having shewn, that if water passes through a road, and fills the native soil, the road, whatever may be its thickness, loses its support, and goes to pieces.

Several new roads have been constructed on this principle within the last three years. Part of the great north road from London by Hoddesdon in Hertfordshire—two pieces of road on Durdham Down, and at Rownham Ferry, near Bristol—with several private roads, in the eastern part of Sussex.

None of those roads exceed six inches in thickness, and although that on the great north road is subjected to a very heavy traffic, (being only fifteen miles distant from London) it has not given way, nor was it affected by the late severe winter; when the roads between that and London became impassable, by breaking up to the bottom, and the mails and other coaches were obliged to reach London by circuitous routes. It is worthy of observation, that these bad roads cost more money per mile for their annual repair, than the original making of this useful new road.

The measure of substituting pavements, for convenient and useful roads, is a kind of desperate remedy, to which ignorance has had recourse. The badness, or scarcity of materials, cannot be considered a reasonable excuse; because the same quantity of stone required for paving, is fully sufficient to make an excellent road any where: and it must be evident, that road materials of the best quality may be procured at less cost than paving stone.

The advantages of good roads, when compared with pavements, are universally acknowledged; the extension of pavement is therefore to be deprecated as an actual evil, besides the greatness of the expence. Pavements are particularly inconvenient and dangerous on steep ascents, such as the ascent to bridges, &c.

Fire Alarm.

Mr. Colberts has invented an apparatus, for the purpose of giving alarm in case of fire, which is effected by the action of a thermometer. It consists of a column of mercury in a tube, with a floating piston, which rises up and down as the mercury expands; the rod of the piston is connected at its upper part to a lever, which, on being raised, lifts a click or holdfast, and sets off the alarm. The apparatus is enclosed within a case, resembling in appearance, having its bottom and sides of open fretwort, and is intended to be placed in a convenient part of the well of the stair-case. In this situation, it is presumed that if a fire happens, the warmth of the smoke, which will always ascend the stair-case, will be sufficient to raise the mercury in the thermometer, and discharge the alarm. The front of the alarm, has a dial plate, similar to a clock, with an index pointing to the degrees of the thermometer, and this index is to be adjusted to two or three degrees above the temperature of the atmosphere, or above the utmost height to which the mercury may be expected to rise, by natural alteration of temperature, during the night. The length of the lever, is regulated by the index, so that whenever the increased temperature expands the mercury, and raises the piston above the point to which the index is set, the lever and click is raised, and the alarm instantly set off.

This apparatus is sold by Mr. Schmalcalder, Strand, London.

Mercurial Log-Glass.

Mr. **Jennings**, of Carburton-street, Fitzroy-square, has invented a mercurial log-glass. The ordinary log-glass, by which reckonings are made at sea, is of the same description as the common hour-glass, containing a quantity of sand. The half-minute log-glass, is calculated to run 28 seconds, but as the size of the particles of sand are not uniform, and are frequently affected by alteration in the heat or moisture of the weather, the reckoning necessarily becomes, at such times, erroneous. To remedy this defect, Mr. Jennings has charged his improved log-glass with mercury, instead of sand, as heretofore, and which is constructed in the ordinary form, but with two passages through one, the mercury discharges itself in 28 seconds, and, upon being turned over, returns through the second passage in 14 seconds as in the ordinary quarter-minute-glass.

This improvement is found to be of great advantage, as the errors above-mentioned by the sand log-glass are entirely removed, and the instrument, in its improved state, is coming into general use and estimation; they are manufactured by Messrs. Gilberts, Leadenhall street, Mathematical Instrument Makers to the Hon. East India Company.

New Method of Heating Manufactories, Warehouses, &c.

Mr. **Perkins** has adopted a very simple and efficacious mode of warming a range of workshops: simply, by one small German stove of the ordinary construction. As air is a bad conductor of heat, the fire of any ordinary insulated iron stove, such as is commonly used in halls, offices, drying-rooms, &c. produces an heated atmosphere, surrounding the stove to a small extent only, the warm effects of which, are scarcely, if at all, felt in the distant parts of the premises, or even of a large room in which the stove is placed. The only thing necessary to be done in this case, is to cause a circulation of the heated air, which he effects by the following means:

In the last room of a range of workshops or offices, communicating with each other, he places his stove, which is a *small German stove*, with its chimney leading into the common flue. At the back of the stove he opens an air or wind-hole through the wall of the building, about the diameter of the cylindrical stove, by which a free communication is made with the open air. Into this aperture he introduces a pipe of the dimensions of the opening, and carries it direct to the back of the stove. He then attaches to the pipe a large plate of sheet iron, and bends the same round the stove, at about three inches distance, as a guide to the current of wind, so as to encompass two-thirds of its circumference; the effect of which is, that the cold atmospheric air, pressing through the wind-pipe, drives away the previously heated atmosphere surrounding the stove, and, becomes itself warmed, as it passes through the narrow space between the guide-plate and the stove; thus keeping a continued current of warm air circulating through the whole range of premises. Mr. Perkins proposes, that a small bason of water should be placed upon the stove, the evaporation of which ameliorates that drying sensation which is so unpleasantly felt upon the lungs where close iron stoves are used.

As the above mode of warming a suite of workshops, was, under our own observation during the whole of last winter, found to be perfectly efficacious and satisfactory, we do, with full confidence of its success, recommend its adoption in manufactories, warehouses, offices, and in every situation in which a regular drying temperature, during the winter, may be required. It is applicable to every sort of close stone, and its cost is of a very trifling nature.

Engraving upon Steel claimed by the French.

The following letter and its answer we copy from the Literary Gazette, Nos. 190 and 191.

Sir,

As you have more than once mentioned in your Journal the inventions of Messrs. Perkins and Fairman, your readers may perhaps be interested by the following article translated from the Bibliotheque Universelle of Geneva for July, 1820.

Claim to the priority of the invention of engraving in relief on copper, by the pressure of a plate engraved by incision (en-creux) *on steel.*

Paris, 25th July, 1820.

Gentlemen,—In your valuable collection, you give the translation of some details respecting the inventions of Messrs. Perkins and Fairman relating to the art of engraving.

The editor of the Journal of the Royal Institution of London*, from which the article is extracted, assigns to his countrymen† the honour of the discovery which he lays before the public, and enriches with it the century we live in, which, though in its infancy, is already so opulent.

Permit me, gentlemen, to protest against these two assertions, and to claim for the eighteenth century, and especially for the

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* The first account of this invention, was given in our Journal for January, No. 1, page 64.

† The writer is not aware, that Messrs. Perkins and Fairman are Americans.

French artists, the priority of the invention and discovery attributed to Messrs. Perkins and Fairman.

I owe it to the distinguished artists, with whose labours my functions associated me during three years, not to permit them to be deprived in silence of one of their fairest claims to the gratitude of the friends of the arts.

M. A. G. Camus, Member of the French Institute, read to that society, on the 17th of March and 27th of May, 1798, a memoir, the title of which was "*Histoire et Procédés du Polytypage et de la Stéréotypie.*" This work was printed at Paris, and published by Baudoir in November, 1801.

I had communicated to M. Camus the original memoirs, and the copies of the writings which my office had enabled me to collect respecting all the parts of the manufacture of assignats, the direction of which was confided to me from 1792 to 1795.

As the room which you can allow to a mere notice does not permit me to enter into long developements, I content myself with quoting the work of M. Camus.

Page 77. The plate of copper being laid upon the plate of *engraved steel**, was subjected to the action of a screw-press, and he (Gingembre) obtained *relief upon the copper* the lines engraved by incision (*en creux*) upon the steel. He disposes plates of Rose Copper, *well annealed*, and after having laid them on the plate of *hard* copper, he caused the two plates together to pass under the rollers of the flatting mill, and this pressure gave him as many plates, in relief, or *en creux*, as he could desire.

Page 87, Fiezinger made some essays in *engraving on steel;* and by the processes mentioned in page 77 identical plates were obtained.

Page 93 and 94. Herhan being charged with the politypage of the etching of the assignats of 400 and of 50 livres, polityped for those of 400 livres, 897 primary stamps or coins, *poinçons méres* (i. e. in relief), 488 secondary ditto (in hollow) ;

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* Were the steel plates hardened after engraving or not?

190 stamps over this number were found to be defective. For the assignats of 50 livres, Herban polityped 4,760 *poinçons meres* (in relief) and 7,684 secondary ditto; 1,140 stamps above this number were found to be defective.

These extracts suffice, I think, to prove—

1. That a French artist (Gingembre) was the first who conceived the idea of transferring to copper the engraving in very low relief executed on steel.

2. That a French artist (Fiezinger) subsequently executed on steel, an engraving which was polityped on copper.

3. That subsequently to this, Herhan was charged to politype on copper, *after the original engraved on steel*, the eagle and the figure of liberty printed on the assignats of 400 and of 50 livres.

I must add, that, at a late period, I made Tardieu retouch the head of Ceres, engraved by him on steel two years before, and that copper impressions were taken from it, not under the stamp or the flatting mill, but under a screw press, (*d'un pas serré*) turning in its nut (*écrou*) of copper; on the head of the screw is placed an iron handle, each part being four or five feet long, which two men, one at each extremity of the handle, cause to descend on the engraved steel plate, which is covered with a plate of annealed copper.

At the instant when the plate fastened to the end of the screw touches the copper, the two men push the bar with an equable motion, and by a *slow and successive* pressure, a pure and perfect impression is obtained of the steel upon the copper.

M. Camus has not fixed the year in which Gingembre made his first essays to obtain an impression on copper from an engraving on steel: the authentic documents in my possession prove that these first trials were made about April 1791; that the multiplication of the two medallions, etched by Fiezinger, were executed under the stamp, by Dioz, from *June to September*, 1792: lastly, that the politypage by Herhan, from steel on copper, and from copper upon copper, was executed in 1793 and 1794.

Experience has discovered, in the use of the various processes described by M. Camus, such defects, that the plates *(pièces)* being no longer identically the same, the employment of engraving in the composition of assignats has been entirely renounced, unless the thing to be printed required only *one single press.*

4. Copper, when strongly pressed, experiences in all its parts an extension proportioned to its degree of annealing and to its thickness. The difference between two impressions in copper has been found to amount, in the eagle and in the figure of liberty, to two centimetres 25-100ths a line; hence the identity is destroyed.

If such a difference has been discovered on so small a surface as that of these two engravings of 30 and 66 square centimetres (4 square inches and 9 square inches), it is easy to foresee the enormous difference which will result from the multiplication of engraving on any large copper plates, especially when this multiplication shall be effected under a cylinder acting as a flatting-mill.

If you think these observations, hastily drawn up, worthy of attention, please to make such use of them as you shall think proper; my sole object has been to prove that we owe the invention to French artists at the close of the eighteenth century.

Please to accept, Sir, &c.

F. E. Guillot,

Ex-director of Assignats.

Paris, Rue Duphot, No. 16.

Sir,

I have, with much satisfaction, read over the paper under the signature of F. E. Guillot, ex-director of assignats, which appeared in your valuable Gazette of the 9th instant, since it affords me an opportunity of doing justice to the inventors of the Siderographic Art. M. Guillot lays "claim to the priority of the invention of engraving *in relief on copper,* by the pressure of a plate engraved by incision *(en creux)* on steel." The inventors of this art do not claim the discovery of engraving *in relief on copper;* it constitutes no part of their process of multiplying copper or steel engraving.

The method adopted by the French artist to multiply engravings is not practicable, and is acknowledged by M. Guillot to have been abandoned long since: what practical man could suppose that copper, having been pressed into a steel engraving, although made harder by the operation, could indent, by its relief, another copper-plate, without enlarging each, and thereby distorting and injuring the engraving?—M. Guillot, after claiming for his countryman this invention, says it is worth nothing, and points out the reason why. He says (and we perfectly agree with him) " Copper when strongly pressed experiences in all its parts an extension proportioned to its degree of annealing, and to its thickness. The difference between two impressions in copper has been found to amount, in the eagle and in the figure of liberty, to two centimetres 25-100 (a line); hence the indentity is destroyed." M. Guillot has, we think, fairly proved that, although the French artists long ago conceived the idea that engravings might be multiplied, yet they could not put their ideas into practice, and, after many experiments, it was given up. Messrs. Perkins and Fairman also conceived the idea of multiplying engravings, and have put their ideas into most successful practice. The simple reason is this: Messrs. Perkins and Fairman's method *is practicable,* and entirely different from the French method, which *is not practicable.*

" If such a difference has been discovered on so small a surface as that of these two engravings of 30 and 66 square centimetres, (4 square inches and 9 square inches) it is easy to foresee the enormous difference which will result from the multiplication of engravings on any large copper-plates, especially when this multiplication shall be effected under a cylinder acting as a flatting mill."

We perfectly agree with M. Guillot, that when copper-plates are attempted to be produced by the above described progress, they, as he has stated, would be destroyed. We have seen a copper-plate made by Messrs. Perkins and Fairman's indenting process, of 360 square inches, without the least enlargement; is not this a proof that the invention is dissimilar? We have also seen some of Heath's most delicate engravings retouched, after having been worn out by use; now, if the plate had been the least enlarged, would the original lines and dots be again renewed? It is very evident, that although M. Guillot perfectly understands the plan adopted by his countryman, he has not correctly informed himself of the system adopted by Messrs. Perkins and Fairman.

M. Desnoyés, the celebrated French engraver, on his recent visit to this city, called on the inventors, and was shewn the process; he, like all the English artists, spoke in the warmest terms of its utility, beauty, and originality; if M. Guillot would visit his countryman, he could satisfy him that what was attempted in France, without success, is now successfully practised in this country. I have only to add, that such is the demand for this invention, that nearly 1,000 steel-plates have already been ordered, for bank-notes and other purposes.

I am, Sir, your obedient servant, &c.

September 13, 1820. JUSTICE.

Extraordinary Copper-plate Printing.

M. GONORD, of Paris, has invented an extraordinary kind of copper-plate printing, by which he can produce impressions of whatever size he pleases from one and the same plate; that is, if a subject be engraved of the ordinary size of a quarto page, enlarged prints can be taken from this very quarto plate, of the size of a folio, or reduced to that of an octavo, or any other size that may be desired.

We have desisted from mentioning this extraordinary production before, under the expectation that some information would transpire as to the mode practised. It now appears, that the print is, in the first place, taken from the plate on to the surface of an elastic composition, made of dissolved India rubber, or a mixture of treacle and glue, which, while the ink is still wet upon its surface, is expanded by stretching in a machine over a sort of drum-head, until its parts are enlarged to the desired size. The wet ink is then transferred to a tablet of gypsum, or such like substance, from which it is communicated to the damped paper by a rolling press. Contracted impressions are produced by first extending the elastic surface, which, when it has received the print, is allowed to shrink again into its natural dimensions, the ink is then transferred to the tablet, and communicated to the damped paper, as before explained.

From this expanding and transferring process it would be expected (as is the case) that the print ultimately given upon paper must be extremely imperfect; but the most objectionable and fatal defect arises from the distortion of every part of the design; which, though sufficient to be identified, yet, upon examination, is a mean caricature of the original, instead of a faithful copy.

The method has been used with tolerable effect upon porcelain, as appears by the report of the Central Jury, appointed to examine the productions of French art exhibited at the Louvre, who have adjudged to M. Gonord a gold medal for his invention; but, with due submission to the enlightened members of that jury, we do not so highly appreciate its merits; nor are we at all times prepared to expect either ingenuity or usefulness in *every* invention which an Institution for the encouragement of arts, &c. either abroad or at home, may think proper to reward with its medals.

Polytechnic and Scientific Intelligence.

GREAT BRITAIN.

Royal Society.

THE *first* part of the Transactions of this Society for 1820, has just made its appearance. It consists of the following Papers:

The Croonian Lecture. A further Investigation of the Component Parts of the Blood. By Sir EVERARD HOME, Bart.

The Bakerian Lecture. On the Composition and Analysis of the Inflammable Gaseous Compounds resulting from the destructive Distillation of Coal and Oil; with some Remarks on their relative Heating and Illuminating Powers. By W. T. BRANDE, Esq.

On the Action of Crystallized Bodies on Homogeneous Light, and on the Causes of the Deviation from Newton's Scale in the Tints which man yof them develope on exposure to a Polarized Ray. By J. F. W. HERSCHEL, Esq.

A Case of Human Fœtus found in the Ovarium, of the size it usually acquires at the end of the fourth month. By A B. GRANVILLE, M.D.

On some Combinations of Platinum. By EDMUND DAVY, Esq.

On the Method of cutting Rock Crystal for Micrometers. By W. H. WOOLLASTON.

Meteorological Journal kept at the Apartments of the Royal Society by order of the President and Council.

In an advertisement we are informed, what indeed has been tolerably well known for some time, that the Royal Society, as a *body*, never give their opinion on any subject, either of nature or art, that comes before them: and therefore it is hoped that no regard will hereafter be paid to any notices, indicating that they have given such collective opinion; such notices, they say, have, in some instances, been too lightly credited to the dishonour of the Society. There may be good reasons for the Royal Society's making this announcement; but its being made, we are naturally induced to ask them of what use to the public this Society is as a *body*. They may meet together and enjoy their philosophical conversations, as we doubt not they do, but we have always considered them as a *public* body, from whom much scientific light was to be expected; whereas they most authentically inform us, that as a body they never give their opinion upon any subject of nature or art!

This society has now existed about one hundred and fifty years, a good and respectable old age for any gentleman. We do not say that it is now in its dotage, but if it pursues the same line of conduct which it has latterly done, with its perpetual presidents and its papers of comparatively little interest, the public will not be disposed to listen to that about which as a body it admits that it has no opinion. Some of the papers, however, in the present part are certainly valuable.

In that on the component parts of the blood,— Sir E. HOME observes, that, "In the examination of the nature of an aneurismal tumour in the microscope, Mr. BAUER found that the layer of the coagulum, in contact with the blood in circulation, was red in its colour, loose in its texture, and principally consisted of red globules from which the colour had been discharged and remained diffused through the mass. Besides these globules he saw others of a smaller size, which he had never met with in other blood, however frequently he has examined it; there was also a small quantity of transparent elastic mucus insoluble in water. The newly discovered globules were $\frac{1}{280}$ part of an inch in diameter, and their number in proportion of one to four of the larger ones, the other layers (the coagulum in the aneurismal pouch being found to consist of a succession of layers) in proportion to the length of the time coagulation had taken place, were become paler in colour, denser in texture, and what is most particularly deserving of notice in the present investigation, the proportion of the number of the small globules to the large ones gradually increased, and in the layer longest coagulated, they were in the proportion of four to one. In this layer there was also the largest proportion of the transparent elastic mucus.

The coat of the artery forming the pouch, appeared to be made up in zig-zag or serpentine fibres, connected to the elastic mucus, in which many of the small globules were detected.

The condensed cellular membrane on the outside of the pouch consisted of thin membranes or fibres, easily separated, and between them were found many small globules.

In the section of a large aneurismal tumour a deposit of crystal was met with; this uncommon appearance is shewn by drawings; on analyzing them, they were found to consist of sulphate of lime, with murate and phosphate of soda, salts usually met with in the blood, but probably never before seen in the form of crystals.

The discovery of small globules in aneurismal coagula, and the increase of their number in proportion to the duration of the coagulum, throws great light, Sir E. HOME thinks, upon the materials of which the blood is composed.

" Till this discovery was made we knew of no globules in the blood but the red globules, either inclosed in their colouring matter, or deprived of it: indeed these smaller ones being held in solution in the serum, are only brought to view by the act of coagulation, and under the same circumstances we find the salts chrystallize.

"On examination of some of the glands of the mesentery of a person who died in a fit, an hour after having eaten dinner, the colour of the milk white fluid which issued from them, was found to depend upon an infinity of white globules, floating in a clear perfectly colourless fluid, in the same manner as the red globules do in the serum of the blood.

"From the observations Mr. Bauer has had the opportunity of making upon the contents of the lacteal glands, he is satisfied that the full size globules acquire that form in these glands, and that afterwards, so far as respects their external appearance, no change is necessary for their conversion into red globules, but their becoming red.

"As the exposure of the blood to the air in its passage through the lungs restores the brilliancy of colour that is lost in the circulation through the body, we can have no doubt, that it is in the vessels of the lungs the blood receives it original hue."

The valuable paper of Mr. BRANDE, on *the composition and analysis of inflammable gaseous compounds*, scarcely admits of abridgment. It is divided into two sections; the first is, on *the inflammable gases obtained by the destructive distillation of pit coal and oil;* and the other, *comparative experiments, on the illuminating and heating powers of olefiant gas, coal and oil gases, and on some general properties of radiant matter.*

Mr. Brande found the specific gravity of some *coal* gas, as low as, 4430; the heaviest, which he has yet met with is, 4940; the specific gravity of gas from whale oil was, 7690.

To produce the light of ten wax candles for one hour, there will be required,

2600 cubical inches of olefiant gas.
4875........................ oil gas.
13120........................ coal gas.

The quantity of oxygen consumed,

by the olefiant gas will be...... 7800 cubical inches
by the oil gas..................... 11578
by the coal gas..................... 21516.

To ascertain the relative heating powers of the flames of olefiant oil, and coal gases, Mr. Brande employed twelve hole Argand-burners, and placed over each as near to the lamp glass as was consistent with a clear flame, a clear copper boiler, 25 inches deep, and 5 inches diameter, slightly concaved at bottom, capable of holding rather more than a quart of water, with an immersed thermometer, and a small vent for steam. It contained two pounds of distilled water, which was raised to the boiling point in similar times, namely, 20′, by each of the flames; so that it would appear, that to raise a quart of water, from 50° to 212° at 30 inches barometrical purpose, requires,

870 cubical inches of olefiant gas
1300 .... of oil gas
2190 .... of coal gas.

From this experiment, it may be inferred, that the air of a room, equally lighted by oil and coal gas, will be much less heated by the former than the latter; but, that the actual heating powers of the flames, is in the direct ratio of the quantity of olefiant gas.

The paper by Mr. Davy, on *combinations of platinum*, is also deserving of attention. He recommends sulphate of platinum as the best test for gelatin.

Dr. Woollaston has been appointed President of this Society, *ad interim.* SIR HUMPHRY DAVY is expected to be the new President.

LINNÆAN SOCIETY.

Extraordinary Flower.

A PAPER by Mr. Brown, on a new genus of plants called *Rafflesia* has been lately read to this society.

The plant from which this genus is established, was discovered in Sumatra, in 1818, by the late Dr. Joseph Arnold. It has lately excited the curiosity of botanists from the extraordinary dimensions of its flower, which is equally remarkable in its structure. It springs directly from a horizontal root, the bud is covered with many round intricate dark-brown floral leaves or bracteæ, and has very much the appearance of a cabbage, which it also nearly equals in size. The expanded flower measures full three feet in diameter, the tube it was supposed would hold twelve pints, and the weight of the flower was reckoned to be about 15lbs. It appears to be allied to the *Asareæ* (or *Aristolocheæ,*) and *Passifloreæ.*

On Artificial Drying, &c. by the Air-Pump.

IT appears by a paper in the fifth number of the Edinburgh Philosophical Journal, that the invention of the process of artificial desiccation under the receiver of an air-pump, and which has been ascribed to a modern philosopher, is due to Mr. EDWARD NAIRNE; a paper concerning which was published in the Philosophical Transactions for 1777. In this paper, it is stated, on the authority of Mr. Cavendish, that *water, whenever the pressure of the atmosphere on it is diminished to a certain degree, is im-*

mediately turned into vapour, and is as immediately turned back again into water on restoring the pressure: the degree of pressure is different according to the heat of the water. When the heat is 72° of Fahrenheit's scale, it turns into vapour as soon as the pressure is no greater than that of three-quarters of an inch to quicksilver, or about one fortieth of the usual pressure of the atmosphere; but when the heat is only 41°, the pressure must be reduced to that of a quarter of an inch of quick silver, before the water turns into vapour. Hence it follows that when the receiver is exhausted to the above-mentioned degree, the moisture adhering to the different parts of the machine will turn into vapour, and supply the place of the air, which is continually drawn away by the working of the pump, so that the fluid in the pear gauge, as well as in the receiver, will consist in good measure of vapour.

*On the Composition of Mortar.**

THE principles of making mortar do not seem by any means so well understood, even at this enlightened period, as could be wished, or indeed as they ought to be from the present improved state of our chemical knowledge. We have paid considerable practical attention to this subject, and shall therefore endeavour to establish a basis on which we think the art of making mortar ought to be erected.

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* From the FAMILY CYCLOPÆDIA, an original work by Mr. JAMES JENNINGS, now in the press, and on which he has been incessantly engaged for nearly two years past. A work designed to contain a concise account of every thing most necessary and useful both in science and in art; embracing the most recent discoveries and improvements in agriculture, chemistry, domestic economy, gardening, &c. The most approved methods of treating diseases by the domestic prescriber, including the mode of treatment in cases of drowning, other accidents, poisons, observations on diet and regimen, &c. A comprehensive account of every subject in natural history; and also a concise view of the human mind and the passions, with their particular application to our improvement in education and morals; the whole to be preceded by an introduction, containing an explanatory summary of the most interesting parts of the work. It will extend to above eleven hundred pages in 8vo. and is expected to appear in the course of a few weeks.

It is well known that the first requisite for making good mortar is good lime, and that such lime should be as devoid of any clayey matter as possible. We have seen under the article lime, that, in order to make quick-lime, common lime-stone or carbonate of lime is exposed to an intense heat, which drives off from it its carbonic acid, its quality as a stone being by this process destroyed; but it is nevertheless by such means in a state, by a suitable addition of carbonic acid, to become stone again. In the making of mortar, our chief object therefore is to supply the carbonic acid necessary for such purpose: for it is well known, that quick lime alone mixed with water will not make good mortar. Various bodies have been added to lime for this purpose: finely sifted coal-ashes are one of them; and, when the colour of the mortar is of no moment, perhaps equal parts of quick-lime and finely sifted coal-ashes, such as those met with in London, form a mortar equal to any for common purposes which can be made. This mortar possesses also the peculiar property of resisting moisture, and is therefore well calculated for such work in which the passage of water is to be prevented; its use of course in lining water cisterns is important. Sea-sand, and the sand obtained in sand-hills near the sea, will make tolerable mortar, but by no means so good as sand or gravelly sand, which may be obtained beneath the surface of the earth, and where spring water is abundant. The fine alluvial matter of fresh-water brooks and rivulets, provided it does not contain much clay, forms with about an equal quantity of quick-lime a good mortar; and indeed where better matter cannot be had, clay itself is sometimes used, but we cannot recommend it. From practical observation we can say that the best lime for mortar is such as is obtained from hard and compact lime-stone; that the lime obtained from chalk is by no means so good; and, that the best admixture with lime for making mortar, is such, that when mixed with water, it assumes little of the pappy consistence which any admixture of clay or soft pulverized stone generally gives it. Two parts scrapings of the public roads, especially when they are repaired with lime-stone, will make, with one part lime, an excellent mortar for plastering, but as a cement for bricks and stones, it is not to be recommended. Plastering mortar has generally some addition of cowhair.

In general, therefore, equal parts of quick-lime and the article which is to supply the carbonic acid, whether sand, fine gravel, coal-ashes, or other matter, will be a fair proportion of each ingredient; but it may happen, from peculiarity of circumstances, that this general rule ought to be departed from: the judgment of the operator must, of course, in such case decide. It must not be overlooked too, that water is a necessary ingredient in the composition of mortar, and from our theory, it follows, that that which contains the greatest quantity of carbonic acid, unmixed with substances not congenial to the composition of mortar, such as clay, and vegetable matter, must be the best. Besides carbonic acid and lime, which are the most important ingredients in the formation of mortar, there is reason for concluding, that the water itself is more than a medium for the formation of the carbonate of lime; but what its precise operation is, we are not prepared to say.

Besides such mortar above described, there are various others usedfor particular purposes, such are **Plaster of Paris**, **Stucco**, **Tarrass**, &c.

Remedy for the Foot Root in Sheep.

There has lately appeared in the periodical publications, a *recipe* for the cure of foot-rot in sheep. The following, from the **Family Cyclopædia**, will be found superior to any which has been made public.

Take of sulphate of copper and gunpowder of each equal parts; rub them together in a mortar into a fine powder, and make them into a paste or ointment with linseed oil. The diseased parts are to be pared and cleaned out down to the quick, and thickly daubed with this preparation; and it is of great importance that the sheep should be kept from motion as much as possible, and in a dry place, for an hour or two after it is applied. The principal reason why this is more effectual than any liquid is, because it remains longer upon the part.

FRANCE.

New Method of Dyeing.

Count De la Boulaye-Marsillac has found, that, in the process of dyeing, when the cloth is soaked in water, previous to the immersion in the dye-vat, the water prohibits the entrance of the colouring liquid, so that the cloth though strongly wrung to displace the water, is able only to receive the colouring matter to a certain depth. In order to remove this inconvenience, the moistened cloth is to be passed through rollers, placed within, and at the bottom of the dye-vat, so that the web passing from one windlass through the dye-vat, and being strongly compressed by the rollers in its passage to another windlass, all the remaining water is driven out into the colouring liquid and is replaced by the colouring liquid, so as to receive colour to its very centre. The winding is continued backwards and forwards from one windlass to the other, and through the rolling-press till the dye is of sufficient intensity.

Agricultural Discoveries.

A discovery of great importance to agriculture has, it is said, been made by M. CADET DE VAUX; it consists *in reaping corn eight days before it is perfectly ripe*, by which the grain is fuller, larger, and finer; and in such case, it is also said, that the corn is never attacked by the weevil. The proper time for reaping, is that, when the grain, on being pressed between the fingers, has a doughy appearance, like a crumb of bread just had from the oven when pressed in the same manner.—We think, however, that this *discovery* requires further verification.

This is an age of discovery! It is said that M. CHEREST has discovered a cheap and effectual method of destroying the *weevil*, that pest to corn, and that he is now in England, intending to submit his discovery to the Board of Agriculture. If this be correct, we hope to hear more of it.

New Patents Sealed in 1820.

To James Harvie, of Glasgow, Engineer, for great improvements in the construction of Machines, commonly called Ginning Machines, and which are employed in separating cotton-wool from the seed.—Sealed, Aug. 18th.—Two months for Inrolment.

To George Millichap, of Worcester, Coach-Maker, for an improvement in Axle-trees and Boxes.—Sealed Aug. 18th.—Six months for Inrolment.

ERRATA IN N°. IV.

Page 300, line 14, *for* "singularity" *read* "similarly."
Page 302, line 18, *for* "trunks" *read* "tanks."

W. Shackell, Printer, Johnson's-court, Fleet-street, London.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. VI.

Recent Patents.

To JOSIAH PARKS, *of the Borough of Warwick, for an Invention of a new and improved Method of lessening the Consumption of Fuel in Steam Engines and Furnaces in general, and for consuming Smoke.*

THE patentee commences his specification with observations upon the disadvantages and inconvenience arising from the smoke which is generally evolved from steam-engines and furnaces: and contends, that a considerable saving of fuel would take place if the whole, or principal part of the smoke and inflammable vapour generated from coal-fires were brought into combustion. With this view, he proposes a particular construction of a furnace to be applied to the boilers of steam-engines, &c. the merits of which consist in exposing the whole column of smoke emitted from the furnace to the action of the flame, by which the greater part of it becomes consumed.

In Plate XVI. Fig. 1. is a vertical section of the boiler, the furnace, and the flues surrounding it, with the brick-work cut through the middle, lengthways. Fig. 2. is also a section of the boiler, furnace, and flues, with the brick-work cut through crossways, about the middle of the fire-place. In these figures, the same letters will refer to the same parts respectively. A, is the boiler, which may be of the ordinary or any other construction as to form. B, is the furnace or fire for heating the boiler. C, C, are flues passing round and under the boiler, and D, D, is the brick-work so contrived that the boiler is supported at its angles only, in order that the flame may pass freely under and round it, coming in contact with nearly the whole of the surface of the lower part of the boiler. E, is a chimney into which the residue of the smoke, or unconsumed part of the vapour is discharged, after it has passed under and round the boiler; *f*, is the steam-pipe from the boiler, leading to the cylinder of an engine or elsewhere; *g*, is the safety-valve of the usual construction; *h*, is a man-hole, by which access is obtained to the interior of the boiler; *i*, is the passage to the furnace, opening on the side for feeding the fire; and *j*, is the ash-pit below. Thus far a boiler and furnace, with its appendages, of the ordinary construction is described; the improvement proposed by the patentee, in order to render the furnace capable of consuming its own smoke, is as follows:

A passage, or channel, *k*, through the brick-work, shewn by dotted lines in fig. 2., admits a current of atmospheric air from the uninclosed ash-pit; this current is carried to that part of the flue through which all the smoke and other effluvia from the furnace must pass. Thus the greater force of the cold dense air rushing into the rarified flue at that point drives back the smoke and light vapour again into the furnace, by which its inflammable particles become ignited, and the principal part of the gas and soot generated from the coal (which in ordinary cases is suffered to escape) becomes consumed. By these means the heat of the fire under the boiler becomes greatly increased; which is an important consideration in point of economy, and at the same time the whole or the principal part of the smoke is decomposed, which has hitherto been found so highly objectionable when emitted from furnaces, &c. of the old construction; *l*, is a door or flap at the bottom of the channel, *k*, for the purpose of increasing or diminishing the column of cold air, which may be opened more or less by means of the handle *m*, connected to the chain *n*, which passes over a pulley, and lifts the door or flap, *l*, to any altitude: consequently the opening of this door will regulate the quantity of atmospheric air admitted into *k*. There is also to be a damper placed in some convenient part of the chimney, which, as its object and construction must be well known, is not shewn in the figure.

Inrolled, November, 1820.

That the apparatus here described will be found to effect its intended object, viz. the consumption of smoke, we have very little doubt, and that its parts are judiciously arranged and accommodated to their respective purposes we are also most ready to admit; but in what consists the *novelty* of this contrivance? A patent was obtained by Joseph Gregson in 1816, for a "*New Method of constructing Chimneys, and of supplying Fire with Fuel;*" in the specification of which, the smoke generated is particularly described as passing through a part of the fire, after it has traversed the flues under the boiler, and by that means enters into combustion, and becomes consumed. There seems to be so close a resemblance between the two methods, that we are disposed to think the present will be considered an infringement upon the former patent.

To JOHN READ, *of Horsmondon, Kent, for certain Improvements on Syringes.*

THESE improvements apply to injecting syringes principally used for medicinal purposes, and consist of a *lateral* pipe or channel, having a flexible tube attached to the lower part of the barrel or cylinder, through which pipe the medicated liquor is forced, instead of repassing through the aperture by which it entered at the end of the barrel as in the ordinary way. Plate XVII. Fig. 1. shews a syringe of this improved construction; the dotted line representing the internal parts. The nozle *a*, is to be immersed in the medicated liquor previously poured into an open vessel, when upon the piston rod, *b*, being raised, the air in the barrel will escape through the pipe, *c*, while the liquor follows the piston through the nozle, *a*, and fills the barrel or cylinder. On the piston being depressed, the ball-valve at the nozle, *a*, falls into the socket and prevents the liquor from returning; which, by the pressure of the piston, is then forced up the lateral pipe, *d*, and the whole contents of the barrel ejected through that passage.

When the piston is again raised, the ball-valve at *e*, prevents the return of the liquor through the flexible pipe, *d*, and the barrel becomes charged as before, with the liquor into which the nozle is immersed; *f*, is a plate at the bottom of the barrel, with holes to admit the liquor as shewn at fig. 2. in the same plate, and at *g*, is a wire across the socket of the exit pipe, *d*, to prevent the ball-valve rising too far from its bed. By this improved syringe, a considerable quantity of medicated liquor may be injected without removing the syringe for the purpose of charging as heretofore.

These improved syringes of a large size, but without the lateral tube, are proposed to be employed for the destruction of insects on plants in place of the barrel engine, as much more convenient for the purpose; the plate *f*, above described is to be pierced with small holes on the outside of the nozle, as shewn at fig. 3. The barrel being charged with water, or other fluid, as above described, when the piston is forced down the ball will fall into its socket or bed, *a*, at the nozle, and close the aperture, while the liquor will be ejected through the small holes in the outer part of the plate, fig. 3., in the form of a shower, according to the number and size of the holes, which may be varied by having several plates to fit cylinders which are differently pierced.

Inrolled, September, 1820.

To WILLIAM BRUNTON, *of Birmingham, Warwickshire, for certain Improvements on and additions to Fire-grates, which he intends to denominate Economical Fire-grates.*

THESE improvements, which are applicable to furnaces and boilers, consist—1st. In introducing the coal and distributing the same in an equal and uniform manner over the whole surface of the fire, without opening what is usually called the fire-door. 2d. In maintaining the heat of the fire at nearly an uniform temperature. 3d. In obtaining a more perfect combustion of the coal than is procured by the fire-grates of the common construction. 4th. In producing a sudden and temporary diminution of the effect of the fire, where the nature of the process to which it is applied may require it.

The fire-grate is of a circular form, supported by a vertical shaft, and moveable round upon its axis, as described in a former patent (see BRUNTON's Patent, page 86); but its support, and the means employed for lowering the shaft vertically when it is required to diminish the heat of the fire suddenly, as well as the mode of feeding the fire by means of a shovel mounted upon rollers, are to be considered as improvements upon that patent.

The shaft of the circular fire-grate, or the axle upon which it revolves, is to pass through a hole as a guide, in a bar or bearer of iron built into the brick-work, and receives its support at bottom upon another bar or bearer of iron, which is to be capable of sliding up or down in grooves, so as to elevate or depress the fire. To this last mentioned bearer is to be attached a rack and pinion, or a lever, by means of which the grate may be raised and lowered at pleasure. Upon the upper end of the shaft, above the upper supporting bar, are extended two or more arms, carrying a strong ring of cast iron, intended to receive the iron bars which are to be placed parallel to each other for the grating of the fire, and round the periphery of this circular grate is to be a double rim of sheet iron, rising three or four inches up, and forming a groove to be filled with sand; so that when the grate is raised, another ring of iron, attached to the wall of the furnace (built with fine brick), may fit into this groove and produce a sand valve for the purpose of excluding the atmospheric air from passing up the sides of the grate.

Two or more passages are made through the brick-work, for the purpose of admitting a current of air to the top of the fire, in order to assist in igniting the smoke, if necessary. These passages are to be opened or shut at pleasure.

The fire-feeder is shaped as a hopper (see the former patent) placed over the feeding-hole, and the delivery aperture at bottom is capable of contraction, as may be required. Below this is a plate of iron placed in an inclined position, and suspended upon pivots for the purpose of being agitated, in order to distribute the fuel and supply the fire equally. There is also a shovel upon rollers passing from a coal-box to the feeding-hole, which is moved by means of a rod or chain communicating with the engine, or any known moving power.

The specification is not illustrated with drawings, and the elaborate description is so confused, that we cannot clearly discover the intended method of operating, which must plead our apology for this imperfect account.

In a concluding paragraph the patentee says, "I wish it to be clearly understood, that the improvements which form the subject of the present specification, do not consist in the invention or construction of the said revolving grate, or of the fire-feeder, these having been already described in my specification of the invention," &c. (see page 86.) "The improvements which form the subject of the present specification, consist in the means which I now employ to apply the said circular grate, and fire-feeders, to coppers for brewing, to stills, to reverberating furnaces for melting or refining metals, to furnaces for heating retorts, to the furnaces of stoves for annealing glass, or cast-iron; or to any other furnace to which the said circular grate and fire-feeder may be applicable, namely, the moveable support and side-guides of the lower end of the upright shaft, and the power of vertical movement now given to the said shaft, and the shovel now combined with the said fire-feeder, as above described; it being, by these means, that the said revolving circular grate and fire-feeder are rendered applicable to furnaces in which it would be either inconvenient or impracticable, to introduce coal through the roof of the furnace."

Inrolled, October, 1820.

To WILLIAM PRITCHARD, *of Castle Street, Southwark, and* ROBERT FRANKS, *of Red Cross Street, Cripplegate, Hat Manufacturers, for an improved Method of manufacturing Waterproof Hats, to be made of Wool, Silk, Beaver, or other Fur, the brims of which are perfectly waterproof, and will, in wet weather, and in every climate, preserve their original shape, being stiffened without the use of glue, or any other material, which would prevent the effect of the waterproof mixture.*

THE shell of the hat being prepared of the usual materials, and dyed and formed into its shape as heretofore, when perfectly dry is to be stiffened with a composition worked upon the inner surface, made as follows:—take one pound of gum kino, eight ounces of gum elemi, three pounds of gum olibanum, three pounds of gum copal, two pounds of gum juniper, one pound of gum ladanum, one pound of gum mastic, ten pounds of shellac, and eight ounces of frankincense: these are to be pounded small and mixed together; which being done, three gallons of alcohol, placed in an earthen vessel, is to receive the pounded gums: the vessel is then to be immersed in a water-bath, the temperature of which is about one hundred and seventy-six degrees of Fahrenheit, but not by any means to exceed that heat. In this situation the mixture must be frequently agitated, observing that the vessel be kept perfectly closed in order to prevent the evaporation of the spirit. When the gums are sufficiently dissolved by the above process, add to the mixture one pint of liquid ammonia, and one ounce of oil of lavender, with a pound of gum myrrh and gum opopanax dissolved in three pints of spirit of wine. The whole of the ingredients being perfectly incorporated and free from lumps, constitute the waterproof mixture with which the shell of the hat is to be stiffened. After the shell has been dyed, shaped, and rendered perfectly dry, as above directed, its inner surface and the under side of the brim are to be varnished with this composition by means of a brush, and then placed in a warm drying-room until hard. This process is to be repeated several times, taking care that the varnish does not penetrate through the shell, so as to appear on the outer side. In order to allow the perspiration of the head to evaporate, small holes are pierced through the crown of the hat from the inside outward. After this, the nap of silk, beaver or other fur, is to be laid on by the finisher as usual; that on the under side of the brim, which has been prepared as above, must be attached with copal varnish.

This is one of the many singular patents which are occasionally inrolled; a greater want of judgment and science we have rarely if ever witnessed. Why elemi, olibanum, frankincense, and ladanum enter into the composition, we cannot comprehend: surely a much better water-proof varnish may be made with only two or three of the above named ingredients and alcohol.

Inrolled, September, 1820.

To HENRY CONSTANTINE JENNINGS, *of Carburton-street, Fitzroy Square, for a Lock or Fastening for general use.*

THE construction of this lock appears to differ but little from tumbler locks in general, and does not, in our opinion, possess any striking advantage or novelty of principle. It consists of various sliders, studs, and tumblers, to be raised or moved by the different steps cut upon the edge of the key. Its action is as follows: the key being introduced into the key-hole and turned part of the way round, the different steps upon its edge will cut against the several sliders, and against a cross-bolt, situated within a circular ward-box, which are all respectively passed into such a situation that the studs and spaces of the sliders, or tumblers, all stand free of the main-bolt, and enable it to pass, before which it could not have been moved. The key being further turned, carries with it a snail, or excentric, which is connected with, and moves upon, the pipe of the key-hole, and as it proceeds, raises a lever that held the main-bolt, at the same time a notch in the snail presses against a large stud, or projecting piece, by which the main-bolt is shot forward. There are several small springs acting respectively against the sliders as usual, in a direction opposite to the force of the key. The specification merely gives a description of the forms of the various wards, bolts, springs and sliders, without pointing out their particular novelty or advantage, or claiming the smallest latitude as to variations of form or position: in consequence, we are to consider that the inventor claims the original invention of every part; and, that the precise form and position of the whole there described, is the subject of the patent right claimed.

Inrolled, October, 1820.

To THOMAS BURR, *of Shrewsbury, for certain Improvements in Machinery for Manufacturing Lead and other Metal into Pipes and Sheets.*

THE mode of forming pipes of lead (or other malleable metal) proposed in the specification of this patent, is by forcing the metal through an aperture of corresponding dimensions to the intended outside of the pipe, and with a core within the pipe to determine its bore. The apparatus consists of a hollow iron cylinder, made particularly strong and sufficiently true for a piston to work easily up and down within it. This cylinder is open at one end and closed at the other, excepting a small aperture in the centre, through which the metal pipe, as it forms, is to be delivered, as well as to allow the piston-rod to pass, which is to be rather more than the whole length of the cylinder. To this aperture in the centre of the cylinder is to be fitted a ring of steel, the hole through which determines the external diameter of the pipe, and the piston-rod, as above described, passing through the middle of the hole, and acting as a core or triblet, is to determine the bore or internal diameter of the pipe, in the same manner as tubes are formed by means of a draw-plate.

The cylinder placed in an erect position upon the top of a very powerful hydraulic press, is to be secured by frame-work; and when the piston is lowered to the bottom of the cylinder, so that the piston-rod or core of the intended pipe projects a little above its top, the melted metal is to be poured through the hole until the cylinder is filled.

Upon the metal becoming set, the power of the press is to be exerted against the under side of the piston, by which the piston will rise, and the metal be forced through the hole above described, in the form of pipe, having the piston-rod within it as a core. When the piston has passed up to the top of the cylinder, the operation is complete, and the new-formed pipe must be sawed round and slipped off the rod. The piston is then to be lowered again, and melted lead, nearly at a red heat, poured upon the top of the cylinder, the heat of which will melt the small piece of pipe that has been left closing the hole from the last operation, when the melted metal must be again poured in to fill the cylinder ready for making the next length of pipe.

In order to alter the dimensions of the pipe, the steel hole may be unscrewed, and also the piston-rod or core, and replaced by another steel hole and rod of a different size to the former. The dimensions of the cylinder may be varied, provided its capacity is large enough to contain a sufficient quantity of lead to make one length of the pipe. The larger it is, the longer the length of pipe may be made. If the cylinder be six inches diameter and one foot long, it will be necessary that its substance or thickness should be at least four inches, and so on in proportion. A small hole is made in the top of the cylinder to assist in admitting the fluid metal, which, when the cylinder is filled, is to be closed with a screw-plug. In the event of the apparatus having stood some time out of use, it may be necessary to warm the cylinder by placing a fire under, by which means it will work with greater ease.

The method of producing sheets of lead, proposed in this specification, is similar to the foregoing, except that, instead of the vessel, which is to contain the melted metal, being cylindrical as above, it is in this case of a square form, of length and depth sufficient to contain the quantity of lead, or other metal, intended to produce the sheet. The slit or aperture through which the sheet is to be delivered must be of the same length as the intended width of the sheet, and the height or breadth of the aperture equal to the intended thickness of the sheet. A plate of steel, intended to form one edge of the slit or aperture, is to be made moveable, so as to alter the breadth of the aperture, and consequently the thickness of the sheet which is to be produced. The construction of this apparatus will be the same as before described, having a piston fitted to the interior of the vessel to be raised by the upward force of the hydraulic press, which, acting against the underside of the piston, forces out the metal contained in the vessel through the slit or aperture in the form of a sheet. The patentee does not claim the invention or exclusive use of the machinery above-mentioned, in all its applications; but states his claim of originality to consist in making pipes and sheets of lead, or other suitable metal, by pressing or forcing the metal in a solid state through an aperture of the form required, and not by drawing or rolling it as heretofore practised.

Inrolled, October, 1820.

To MAJOR ROHDE, *of Lemon Street, Goodman's Fields, London, for a Method of separating or extracting the Molasses or Syrup, from Muscovado or other Sugars.*

IT having been discovered that a considerable portion of the colouring matter of sugar, which constitutes molasses, adheres to the finer crystals of the sugar, the patentee proposes to remove this colouring matter, or molasses, by absorption. With this view, he breaks the lumps* and passes the whole through a sieve, the wires of which must not be so close as to injure the grain. He then spreads the sugar out in thin layers upon linen cloths or other absorbent surfaces, and when several are laid together, the whole must be subjected to friction, by which the molasses will be absorbed or taken up by the cloths, and the sugar remain in a clarified state. The molasses may be afterwards collected by washing the cloths and subjecting the liquor to evaporation.

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* See Brocksop's invention for crushing sugar, page 13.

Inrolled, October, 1820.

To WILLIAM ARCHER DEACON, *of Pilgrim's-Hatch, South Weald, Essex, for certain Improvements in the Manufacture of Boots, Shoes, and Clogs, by the Application of certain Materials hitherto unused for that purpose.*

THE improvements of this patent consists in the application of whalebone or whalefin, in different forms and stages of preparation, either to the exterior or interior of the soles of boots, shoes, or clogs, for which purpose a selection is made of the most smooth and flat pieces of whalebone, which are sawed in a cross direction to the fibres into pieces of convenient lengths for working. It is proposed to use the shell, or hard exterior of the whalebone or whalefin for inner soles, from which the soft fibrous inside is to be removed. In obtaining this, the above pieces are to be split breadthways, and all the fibrous parts scraped or rasped off, leaving the shell or outer hard glossy skin of the whalebone, reduced to about the thirty-second part of an inch in thickness. Being thus prepared, and cut to the form of the last, and soaked in hot water, they are then to be worked into the boot or shoe in the place of the inner sole, using a piece of basil or other flexible leather as a lining.

The exterior sole and heel of the boot, shoe, or clog, is to be made of whalebone or whalefin, not split and prepared as above, but used in its entire state, cut into shapes by a fine saw, and attached in several pieces by means of screws, nails or rivets, passed through holes drilled round the exterior edge of the sole. These outer-soles may be attached to shoes of the ordinary construction.

No part of this invention extends to any mode of fixing the parts of boots or shoes together, but merely to the introduction and use of prepared whalebone, or whalefin, as an internal sole, and the use of it in its natural state externally. We presume, that the object of this invention is to render boots and shoes water-proof; it is not, however, so stated in the specification.

Inrolled, April, 1820.

To SAMUEL FLETCHER, *of Walsall, Staffordshire, for an Improvement on, and Additions to Saddles, Saddle-straps, Saddle-girths, and Saddle-cloths, by the application of certain known Materials hitherto unused for that purpose.*

THE object proposed in this patent is, to render saddle-girths elastic by the addition of springs; which is effected by attaching one end of the strap to a worm-spring in the following manner. Plate XVII. fig. 6. exhibits the elastic part of the girth, in which *a*, is a strap of leather folded and stitched to the buckle; *b*, a piece of leather to be attached to the girth, upon which are stitched two thick pieces of leather *c*, *c*, forming a recess for the spring to act in; *d*, is a metal plate fixed to the end of the pieces, *b*, and *c*, *c*, having an opening or eye for the strap *a*, to pass through; *e*, is another piece of metal attached to the end of the strap *a*, intended to act as a stop or resistance to the spring; *f*, is a worm spring coiled round the strap *a*, the action of which is confined within the two plates *d*, and *e*: now, if a force be exerted upon the springs by pulling the buckle and strap *a*, the worm becomes contracted, which will be the case when the girth is tightly buckled; but in the event of the body of the horse shrinking, the elasticity of the worm-spring will keep the saddle firmly secured to the horse's back, which is not the case with girths of the ordinary make.

The worm-spring *f*, is to be formed and tempered so as to allow the strap *a*, to draw out a very little way by a power or weight equal to twenty-five or thirty pounds being attached to it, and its resistance is to be such, that not less than fifty or sixty pounds so suspended, will compress it close together.

When the spring and other parts are formed and connected as above described, and shewn in fig. 6., then the outer strap *g*, fig. 7. is to be stitched over the whole, leaving an aperture at *h*, for the passage of the strap *a*, moving in and out, as the force exerted upon the girth or other bandage round the body of the horse may require it to contract or elongate.

Inrolled, November, 1820.

To JOSEPH MAIN, *of Bagnio Court, Newgate Street, London, for an improved Method of preparing and spinning Wool, Cotton, Silk, Flax, Fur, and all other Fibrous Substances.*

THE improvement which constitutes the subject of this patent, consists in certain alterations in and additions to parts of the ordinary spinning apparatus. The wool cotton, silk, flax, fur, or other fibrous substance, is to be hackled, carded, or otherwise dressed as heretofore, and then operated upon by the drawing machinery as usual, which constitutes no part of the present improvement. In this stage of the preparation, immediately from the drawing-machine, the improved apparatus takes up the process of roving, spinning, or doubling. The spindles are placed in a horizontal position, and consequently the bobbins and flyers turn vertically. This mode of placing the spindles and bobbins, however, though differing from the general arrangement of spinning apparatus, the patentee does not claim as an original invention.

The improvements claimed are divisible into four heads, viz. First, the situation of the whirl, or pulley by which the spindle and flyer is made to revolve; this is placed near the end of the spindle, as seen at *a*, Figure 1, Plate XVIII. and to which a band is to be connected from a first mover. Secondly, the arms *b*, *b*, of the flyer, made of bright steel wire, are capable of being removed, and others supplied in case of accident: they pass through holes drilled in the ends or shoulders of the flyer *c*, and are secured by means of small screws, as shewn in the figure, their extremities being twisted so as to form eyes for guiding the thread or yarn to the bobbin. Thirdly, the flyer is made capable of adjustment, so that it may be slidden upon the spindle, and fixed in any desired part, by means of a screw passing through the neck of the flyer holding it upon the spindle, by which it may be accommodated to bobbins of any length. Fourthly, the lateral traversing or sliding of the bobbin upon the spindle is guided, and its revolving velocity regulated by the spring wires *dd*, fig. 1, 2, which are mounted upon a swivel *e*, connected at bottom to the traversing bar, *h* which springs *d d*, act above in a very smooth groove formed at the end of the bobbin: by these means, the usual advancing and receding motion of the traversing bar is communicated to the bobbin, in order to bring it in a situation to receive the yarn or thread, so that it may be uniformly distributed upon the bobbin. The velocity of the bobbin's revolution may be retarded by bringing the spring wires closer together, for the purpose of pressing the bobbin, which is done by turning the screw *f*, and thus the bobbin may be regulated so as to draw off the yarn or thread quicker or slower, as circumstances require.

The operation of roving, spinning, or doubling, is as follows:—the wool, cotton, silk, or other fibrous substance, is delivered from the drawing machinery (which must be supposed as situate at or near the letter A), and passing through the hollow part of the spindle, seen at *k*, comes out at the eye *g*, whence it proceeds to the lower eye of the flyer arm *b*, and along the arm to the upper eye by which it is guided on to the bobbin. The spindle of polished steel, resting horizontally in the cocks *i*, and *l*, is made to revolve by means of a band, as before mentioned, passing over the whirl or pulley *a*, attached to the spindle, which carries the flyer and its arms *c*, *c*, *b*, *b*. By the revolution of the spindle and flyers, the yarn or thread is roved, spun, or doubled; the woolly fibres of which are also, by the same operation, farther drawn and slightly twisted, as well as the short loose fibres more effectually worked in and incorporated with the longer.

In order to remove the spindle for the purpose of changing the bobbin, the cock *l*, is made to turn horizontally upon a pivot, *m*; which pivot, being a thumb-screw, fastens the cock where the spindle is mounted. By this apparatus, the patentee states the roving to be so much improved, that less doubling than heretofore becomes necessary, and that the thread spun is both finer and stronger than any other spinning machinery; it is also produced much more rapidly or in greater quantity.

The size and velocity of the machinery must be varied, according to the nature of the material intended to be operated upon, and also in the different processes of roving, spinning, and doubling; but the construction and arrangement of parts are the same. It isconsidered by the patentee, that this improvement upon the ordinary spinning apparatus is principally estimable from the means afforded of regulating the comparative velocity of the bobbin to the flyer, which is done with such ease and delicacy, as to produce finer thread, better yarn, and greater quantities than heretofore; also that it is equally applicable to hand or mill spinning.

Inrolled, July, 1820.

To THOMAS COOK, *of Brighton, Sussex, for an improved Apparatus for the Purpose of Cooking, which he designates a Philosophical Cookery.*

THIS cooking apparatus consists of a fire-grate or range, with various contiguous chambers, or hot closets, ovens and boiler, &c. with flues passing from the range to heat them. Plate XVI. fig. 3. shews a vertical section of the apparatus, taken parallel to the front, at about two feet back; and fig. 4. is a section at right angles to the front, cut through the middle of the fire grate. These figures exhibit the relative situation of the respective parts, and the direction of the flues.

The bars of the range are capable of being removed, having their ends made with necks which rest in notches in the side; *a*, is the fire-place, with the ash-pit below, from whence the flame and heated smoke pass through the flues, *b*, *b*, *b*, as will be hereafter more fully described; *c*, is a roasting closet, lined with sheet iron, and heated by the flame passing over it. This closet is intended to receive a spit and rack, which are connected to, and closed in by a door in front, made to draw out upon rollers; *d*, is a hot closet for keeping victuals warm after it has been cooked; *e*, is a hot-plate closet, heated by the flame passing under it and up its side; this is intended for stewing or boiling, &c.; *f*, is a similar hot-plate closet, heated by the flame passing up from the main flue through a circular aperture in the brick-work: in this closet, part of the bottom plate may be removed for the purpose of placing a sauce-pan over the flame; the doors of these closets open by sliding up and down in grooves; *g*, and *h*, are ovens heated by the flues which pass over or around them, having falling doors upon hinges; *i*, is a boiler at the back of the range, under and up the back of which, one of the flues passes.

A fire being made in the range, that portion of the smoke which is not consumed will proceed, accompanied by heat through the respective flues, *b*, *b*, *b*; first under the sliding plate, *k*, at the back of the range, which becomes heated for the purpose of receiving saucepans, or stewing vessels upon it. Beyond this, the flue passes under and up the back of the boiler, and hence into the chimney. The main flue extends in a lateral direction as seen in fig. 3. heating the closets, *c*, *d*, *e*, and *f*, and also the ovens, *g*, and *h*, as above described, and may be also carried on through the brick-work as at *A*, for the purpose of heating another boiler. The upper parts the flues are all furnished with dampers as usual, and also with scrapers to remove the soot. Small pipes communicate with the respective chambers in order to carry off the steam.

A steam-box or kettle, for cooking at a distance from the range, or in another room, is also described, which is supplied with steam by a pipe passing from the boiler; or there may be several of them of the same construction. This steam-box consists of two parts, an upper and under vessel, which fit together in a groove containing water, by means of which a steam-tight joint is produced. The upper part of the vessel, a sort of hood, is fixed near the cieling, having the steam-pipe opening into it with a cock, and the lower or movable part of the vessel is placed upon a bracket or shelf, which slides vertically up and down in a groove supported by a line and balance-weight passing over a pulley; this is the receptacle for the victuals, and, when put into action, must be raised or slidden up and joined to the hood or cover, so as to make it steam-tight; the steam-cock is then opened and the operation of cooking goes on.

Inrolled, August, 1820.

To JOHN BARTON, *of Falcon Square, London, for certain Improvements in Propelling, and in the Construction of Engines and Boilers applicable to propelling and other purposes.*

THE improvements proposed in this patent consist of five parts; viz. first, in the construction and form of the boiler of a steam-engine, the situation of the fire, and the arrangement of the flues, by which the greatest possible surface of the boiler is exposed to the action of the fire. Secondly, in forming the rod of a lift-pump hollow, so as to make it the channel up which the water is to flow after it has passed the bucket. Thirdly, in the construction of the chamber and piston of a forcing pump, as of a fire engine, garden engine, &c. Fourthly, in a mode of supplying pistons with oil or other grease by means of a valve in the top of the cylinder. And fifthly, in the construction of paddle wheels for propelling vessels in water,

The boiler of the steam engine is proposed to be cylindrical and placed in a horizontal position, a cross section of which is shewn at fig. 5. Plate XVII. *a* is the fire placed upon the grating, and *b* is the ash-pit for the reception of cinders and dust; *c*, *c*, are parts of the boiler occupied with water; *d*, *d*, are parts of the flue passing from the fire up through the water; and *e*, is the chimney for the ultimate exit of the smoke. The flame and heated vapour emitted from the fire passes along the flue under the boiler, and near the extremity of the cylinder turns up as represented by the dotted lines; it then enters the right hand flue *d*, passes along it, (being the whole length of the boiler,) and coming round in front of the middle partition (filled with water) proceeds along the left-hand flue, *d*, to the farther end of the boiler, where it escapes through the chimney, *e*, into the open air. By this disposition of the flues, which pass through the boiler and are surrounded with water, the possibility of their burning is prevented, and the greatest surface of the boiler is subjected to the action of the heat.

Fig. 6. shows a section of the barrel of a lift-pump; *a*, is the bucket with stuffing as usual, fitted to the barrel; *b*, is the bucket-rod, in this case made large and hollow; *c*, is the clack or valve. When the rod and bucket are forced down into the water, the valve, *c*, rises, and the water flows through the bucket into the hollow rod.

Upon the rod and bucket being raised, the valve, *o*, falls, and the column of water in the hollow rod will be carried up and discharged at top.

Fig. 7. shews a section of the chamber of a forcing-pump, in which *a*, is what is commonly called the suction-pipe; *b*, *b* 1, *b* 2, is the chamber; *c*, and *d*, are fans acting as pistons; *e*, and *f*, may be supposed to be the levers, or arms, which work the fans. Upon the right-hand lever, *f*, being depressed, as shewn in the figure, the valve or clack, *d*, will open, and the water flow through it into the right-hand space of the chamber, *b* 2. Upon the left-hand lever, *e*, being depressed, the fans will alter their situation, the clack, *d*, will close, and the clack, *c*, open, by which the water will flow through *c*, into the left-hand part of the chamber, *b* 1, at the same time the water, which occupied the right-hand side of the chamber, *b* 2, will, by the fan, *d*, be forced out through the clack or valve, *h*, then open, and pass into the breeches-pipe, *i*, *i*. Another stroke of the pump (that is by again depressing the lever, *f*,) will bring the fans, *c*, and *d*, as seen in the figure, and force out the water from the chamber, *b* 1, through the clack, *g*, into the breeches-pipe, *i*, *i*. Thus the water accumulating in the breeches-pipe, becomes forced up into the air-vessel, *j*, in which the elasticity of the air acting upon the water, ejects it with considerable force through the exit-pipe, *k*, and thus the apparatus may be used as an engine for extinguishing fire, &c.

The method of supplying a piston with oil or grease is by forming a groove or channel in the top of the cylinder, and filling this channel with the oily matter, which is admitted into the cylinder, by occasionally opening a cock placed in this groove, the handle of which may be connected to a rod or some other contrivance, and the cock be opened by the action of the piston-rod.

The improved paddle-wheel is made as a hollow drum, having the float-boards placed as tangents to the periphery of the wheel, with curved edges, and the wheel itself buoyant, so as to accommodate itself to the surface of the water.

The respective advantages of these inventions are not pointed out in the specification, and we are not sufficiently aware of their superiority to inform our readers upon that subject. As to the originality of the plans, we cannot but consider them slight, very slight variations from other inventions which have long been before the public.

Inrolled, November, 1820.

Original Communications.

On the Composition of the Blood.

To the Editor of the London Journal of Arts and Sciences.

SIR,

THE notice which you have given of the contents of the paper of SIR EVERARD HOME, relative to the component parts of the blood, has excited my attention; and I have also since read the paper in the Philosophical Transactions.

Really, Sir, I marvel at the gravity with which that paper is written. What would be said if any tyro of only twelve months' initiation in anatomy and chemistry had proposed to determine the component parts of healthy blood by submitting to examination for that purpose the coagulum of an aneurism which had been so long quiescent, *stratum super stratum*, that the saline parts had actually crystallized?—And so the *discovery* of small globules in aneurismal coagula and the increase of their number in proportion to the duration of the coagulum, throws great light upon the material of which the blood is composed! whilst, till this discovery was made, we knew of *no globules* but red globules. But is Sir Everard Home quite sure that these globules existed in the blood at all previously to its being coagulated in the aneurism; and if he is not, how is he sure that they are not the product of disease or of some peculiar modification of the blood at, or after, such coagulation. What does not appear is to be presumed not to be. If these globules be only found in the coagulated blood of an aneurism, the presumption is, that they are the product of such coagulation, or of some circumstances connected with it, and therefore the *discovery* as to the component parts of healthy blood amounts to nothing.

There can be no harm in investigating the component parts of the coagula of an aneurism; but it is certainly very injurious to science where men of known character announce, from having discovered certain globules in such coagula, that such discovery *throws great light upon the material of which the blood is composed.* Whereas such blood must be the most unfit to determine the composition of healthy blood, for the best of all reasons; because we cannot possibly know what changes it has undergone during its quiescent state.

I am, Sir, your's, &c.

Ελαχιστοτερος.

London, Nov. 14. 1820.

On Road Making.

To the Editor of the London Journal of Arts and Sciences.

SIR,

THE *public roads* are always subjects of great interest, and therefore in your account of Mr. M'Adam's method of road-making, and of repairing roads, you have done well in calling attention to the subject. But I hope, Sir, you do not suppose we shall take all that gentleman's *ipse dixits* and other quackery for granted. After giving him every credit for his method of management, where he has himself personally superintended, we shall still find reason to call in question many of his assertions. How, for example, can we be weak enough to believe, that "*the thickness of a road is immaterial as to its strength for carrying weight;*" (see your last Number.) And how can we believe, against the evidence of our senses, that "*substituting pavements for convenient and useful roads, is a kind of desperate remedy to which ignorance has had recourse.*" It may be a desperate remedy, but it is a remedy to which the good sense and knowledge of the citizens of London have obliged them to have recourse. And how can we consent to the doctrine, that stones ought to be laid down on a bog without any substratum whatever, notwithstanding his evidence given before a committee of the House of Commons, and notwithstanding he has obtained a certificate from a magistrate, of the efficacy of a certain mode of making roads over a bog? The committee of the House of Commons, by the questions which they put to Mr. M'Adam on this subject, appeared surprised, and well they might, at his answer to the question, "Have you not found, that the foundation of bog sinks? He says, "No; not a bit of the road sinks." He had previously informed the committee that "the road in Somersetshire between Bridgewater and Cross is mostly over a morass, which is so extremely soft, that when you ride in a carriage along the road, you see the water tremble in the ditches on each side; and after there has been a slight frost, the vibration of the water from the carriage on the road will be so great as to break the young ice." Now, Sir, taking the definition of a bog or morass as being a "*quagmire generally covered with grass, but not always solid enough to support the body,*" I ask Mr. M'Adam, where, in all the line of road between Cross and Bridgewater, does it pass immediately over a bog or morass? On the contrary, will he deny, that there is not uniformly between the surface of the road all the way from Cross to Brent, and even to Highbridge, a stratum consisting of some feet in thickness of *hard clay* immediately under the road, before you arrive at any *peat*, or as it is called, when lying deep under clay in that country, *pill-coal,* whatever? And in order to prove my account of this road correct, bricks are made at Cross, at Wear, and, occasionally, on or near the whole line of road which Mr. M'Adam states is over a morass. If, therefore, this road is the only road which he has made or repaired over a bog, his assertions and experience go for nothing. As to the vibration of which he speaks, I can inform your readers that vibration will take place when a rapid carriage passes over solid clay, and when the substratum is gravelly sand: but of the extent of the vibration to which he alludes on that road, I may be permitted to entertain some doubt: for I have been acquainted with the whole line of road to which Mr. M'Adam alludes for upwards of forty years past.

I have but one or two observations more to make relative to Mr. M'Adam. He orders the stones to be broken small, the pieces not more than *six ounces* in weight each. This is almost the whole sum and substance of his system of road-making; but if he supposes that he is the first person who made this discovery, he is egregiously deceived. From the bad state in which the roads were for years in every direction round Bristol, the discovery may be new to him and to the citizens of that city; but not so to us inhabitants of the lowland districts of Somersetshire. More than thirty years ago the stones were broken small, and a part of the road from Cross to Bridgewater was in excellent condition; and generally has been, from that period to the present time, without the intervention or opinion of Mr. M'Adam. The part of the road to which I allude is that passing through Huntspill; and as names and dates in such statements are important, I may mention that *Mr. Thomas Greenwood*, an inhabitant of Huntspill, and a Commissioner of the Turnpikes, was the person under whose management that part of the road was so well kept; and that *John Hunt*, a labourer living at South Brent, broke the greater part of the stones, and did most of the other manual labour on that road. At no period since, has that part of the road been in better, if so good a condition, as it then was. This road, it should not be forgotten, is always repaired with lime-stone. It may be also necessary to mention, that this road has always been kept much more circular than Mr. M'Adam recommends: perhaps it is more convex than is necessary; but I am quite sure, that whoever, in making or repairing a road of thirty feet wide, raises it only three inches in the centre, according to Mr. M'Adam's directions, will egregiously err, unless it be kept in very extraordinary repair indeed.

Whilst writing on the subject of roads, I would observe, that a small tract, lately published by Mr. CHAMBERS, is deserving of attention by road-makers. Mr. C.

well observes, that, "In the formation of a new road, whatever may be the particular convexity determined on for the surface, the foundation should partake of the same curvature; by which regulation, the whole substance of the road will assume the character of a *bridge*, and be proportionally stronger than if formed on a horizontal plane. Much has been said of the convexity of roads. Formerly the barrelled road was the fashion; now an almost perfectly flat one is as much advocated—the extreme of both is evidently wrong. Roads partaking in convexity the segment of a small circle, for the sake of lateral drainage, especially in undulating districts, where a perfect level cannot be maintained in every hundred yards, must be wholly unnecessary; the middle part soon becomes the only beaten track, and as much out of repair as if the road was not one third of its width; such roads should be flattened to a rise at most, of five inches in the centre, where the width shall not exceed 2 poles, or 33 feet; but roads lying on a descent, instead of being less, should often [*always*] be more round than those on a plane, to insure lateral drainage. In level districts, where longitudinal drainage is difficult to be obtained, it would be equally unwise to disregard a proper curvature; and instead of five, an elevation of eight or nine inches [in a road 33 feet wide] may be found necessary. Even in the former instance, a due elevation in the centre will always be found beneficial." These are sound observations, and well deserving the attention of those whom Mr. M'Adam's quackery has led astray. It should be always kept in mind, that the *sole* intention of keeping roads circular is, that they should immediately discharge whatever water falls upon them; a rise of three inches in the middle on a road thirty feet wide will scarcely, if ever, be sufficient for such a purpose, in consequence of the dirt which will unavoidably collect even on the best formed and best kept road.

I am obliged to return once more to Mr. M'Adam. He advises that, "nothing should be laid on the clean stone on pretence of *binding*." Mr. M'Adam is certainly no chemist, or he ought to have known that one of the reasons why hard, compact lime-stone forms such good roads is, because the pressure and friction of wheel-carriages make of such stone a kind of mortar, which, sinking down between the crevices, binds the whole togther. I have therefore no hesitation in saying, that if any material could be found which would operate like this on roads, it would be desirable to use it. This I presume however, except on lime-stone roads, or roads repaired with chalk and flint, is still a desideratum; or at least such a one as is too dear to be introduced in the making of roads generally.

Before I close my letter there is another recent publication, by Mr. WICKENS, which may be noticed. It is entitled, "*The Improvement of the English Roads, urged during the existing dearth of employment for the Poor.*" This tract is deserving the attention of our political economists. But while I think it is quite clear that with proper management many of our idle population may be advantageously employed in the improvement of our roads, I am compelled, at the same time, from the statements of Mr. Wickens's pamphlet, to conclude that there are objections, we fear many of them insuperable, to the making of such employment efficient. It appears by the Parliamentary Report of the Committee appointed to take into consideration the acts now in force regarding the Turnpike-roads and highways in England and Wales, ordered to be printed in July, 1819, that "the systems most confidently recommended were of a novel and speculative nature, and that the regulations which it was proposed to found upon them too strongly *affected the interests of vested property.*"

It seems, that the whole expenditure for the repairs of the roads throughout England, amounts to the enormous sum of two millions per annum; and that the turnpike trusts of this country, according to Mr. Protheroe, are involved in debt to the amount of seven millions sterling! This last is, in my opinion, the greatest obstacle to the amelioration of our roads and of an alteration in their management. These *vested interests*, and interests *not* vested, which pervade in too many instances our turnpike and highway management, as I have had too often occasion to observe, bar almost every attempt at alteration. But the public ought to know, that if *magistrates*, *commissioners*, and *surveyors* always did their duty relative to the roads, and acted according to the spirit of the acts of parliament now in being, our roads would be in a much better condition than they now are. I could point out instances of gross partiality, neglect of duty, and illegal conduct, in many of such persons above-named, but *taceo*.

A NATIVE OF SOMERSETSHIRE.

London, Nov. 18, 1820.

On Vegetation.

To the Editor of the London Journal of Arts and Sciences.

SIR.

There is, I conceive, a great error which one of your correspondents has published in the Philosophical Magazine, and is still teaching in his public lectures. This

Gentleman has endeavoured to establish, "*That vegetation in all its stages deteriorates the atmosphere.*" In his lecture on vegetation, he observed, that however a doctrine might be sanctioned by the authority of great names, even through many ages, yet he would not receive it unconditionally, but put it to the test of reason and experiment; and if they would not bear him out he would reject it. For the same reason he cannot require any one to admit a doctrine upon his authority. I commend him for his determination to think for himself and to abide by an unerring standard, that of faithful experiment. I am surprised however to find that he himself has been carried forward with the stream and plunged into the gulph. In allusion to two authors who maintained on this subject a contrary opinion to his own, namely, that vegetation rendered the atmosphere more salubrious, he says they did not make fair experiments: they took leaves separated from plants instead of growing plants, and put them in water instead of inclosing them in air alone. I am astonished that he did not discover the fallacy of his own experiments, but endeavoured to establish a doctrine important in its consequences on the result of such vague and indeterminate experiments as were there made, and not at all applicable to the case. Can any man believe that in the barren parts of the earth, where there is little or no vegetation, that the atmosphere is more salubrious than where vegetation is luxuriant? Impossible. Will any man possessing the full exercise of his senses, believe that the fine fragance of the morning air, and all the beauties and glory of spring, carry in their train, sickness, debility, disease and death? Impossible! As soon would they believe that by taking food they would become emaciated. Common sense forbids the conclusion: yet the lecturer to whom I allude, boldly affirms and contends that his experiments have proved that vegetation through all its changes, from germination to the production of perfect fruit, deteriorates atmospheric air, and increases its mischief in proportion to its progress. I give him credit for much scientific knowledge; for many well conducted experiments; but I cannot compliment his judgement in this case: for how did he attempt to prove his theory by experiment? He put his vegetables, in different stages of growth, into a small quantity of confined atmospheric air, and having kept them some days: "Now you will see" said he "that they have all injured the air by having absorbed the oxygen: and moreover the seed itself will not germinate without oxygen gas, and even when it has germinated it will cease if deprived of oxygen."

Would any man, at all instructed in the principles of philosophy, want an experiment to prove this? Or does the most ignorant peasant want to be told this? No one wants a further proof than that which occurs daily, that vegetation will not thrive in crowded cities and in close places. These experiments therefore do not at all apply to the point in question. But why did he pass over or reject Drs. Priestley and Ingenhouz's experiments, which were much fairer and more applicable to the case than his own? They proved that air which had been respired by animals, and that also imparted by combustion, so that neither life or flame could any longer be supported by it, after a growing plant had been placed in it for a short time before, was fit and able to maintain either. This surely demands equal credit if not more than those cited. It was justly observed in the lecture, that some plants require more oxygen than others; they certainly do so: but how are they to acquire the oxygen they want, when they are excluded from the air altogether? When they had fed on the small quantity which their confined atmosphere contained they necessarily sicken and die. As well may an animal be vigorous and strong when shut up with a small portion of food for several days, as that plants can live without atmospheric air. From Dr. Hill's and others experiments, it is clear that plants and flowers will grow most luxuriantly when superoxygenated. If plants do perspire, as the gentleman affirms, I am not disposed to deny it, is it not to be expected that the excrementitious parts, when thrown off, may be injurious to the plant when confined in the atmosphere around it? Whatever is emitted from the circulating vessels is excrementious and unnecessary for its support. His experiments were not calculated to prove that this perspiration was not oxygen; because if they had no access to oxygen how was it possible they could emit any? He very scientifically ran the analogy between plants and animals; and to illustrate his idea referred to the black-hole at Calcutta: so many persons confined in a small place, the carbonized air from their own lungs was sufficient to produce death. Plants would doubtless die in the same situation: but I question much, notwithstanding the gentleman's *conclusive* and *indubitable* experiments, if an hundred growing plants of the succulent kind had been introduced among them, whether their lives would not have been prolonged by the plant imbibing the carbonic acid gas which so soon proves fatal to the lungs. He moreover said, that his opponents required of him, as he asserted that vegetation, instead of renovating, deteriorated the atmosphere, a better theory; and show why the atmosphere is not wholly deprived of its oxygen, and so become incapable of supporting life or flame. This he declined to do. Being an able chemist, he must know that the component parts of all vegetables are nearly the same, varying only in their quantities and proportions. Did he not recollect, that if plants inhale atmospheric air, one of its component parts may be given out again. If a plant, as the sorrel, possessing an acid, the base of which consists of oxygen, retains a large portion of it, probably giving out the nitrogen, may not other plants retain the nitrogen of the atmophere and emit the oxygen? The carbon by which plants are fed, he acknowledges they receive from the earth, and particularly from manure: but did the gentleman forget that some trees have increased their growth and weight prodigiously by means of water and air alone, deprived wholly of earth and manure, from whence they might derive carbon or carbonic acid gas? He will not surely deny that growing plants have the power of decomposing water and uniting its constituent parts with themselves, for such purposes as nature has designed them. In this case, a slow process of combustion must have taken place, to supply the trees with carbon for the purpose of forming the woody fibre. In his experiments, how could water be decomposed where there was none? Does nature ever wholly deny them water? Even in the driest season the air always contains a quantity of it in solution. Even if water were present without a circulation of air, the absorbent vessels, might be too weak and inactive to take up the necessary supply for the maintenance of life. Such, at times, is the effect of water in the spring season as to produce a most astonishing growth, even in one night. After such a rapid absorption of water, and the immediate decomposition of it, there is no doubt but much oxygen is evolved, and many experiments have been made to prove it in a much more conclusive manner than the gentleman above alluded to proved his position. The results of experiments made in such an unfair and partial manner ought never to be confided in.

I remain, &c.

Z. W. V.

Note by the Editor.—We have given place to the above letter, because we are always anxious to let our correspondents speak for themselves. But we, as well as the philosophical world generally, have long supposed that every operation of nature is merely a part of a process which, when completed, *restores the balance;* thus, if plants require at one period or time of the day the presence of oxygen, or of bodies containing oxygen, and absorb it, they at other periods give the oxygen out again. Plants may, it is true, in given situations, and at certain periods, deteriorate the atmosphere, but at others they furnish it with a great portion of oxygen, and consequently, the balance, as we know experimentally, is, upon the whole, preserved. Were not this the case, how long could mankind possibly exist on the earth?

We have received another note from the same correspondent, complaining of the vagueness of the term poison, as applied to many of the substances mentioned in a *Toxicological Chart* lately published. Perhaps it is impossible in such a publication to make it sufficiently intelligible to every class of persons without encumbering it with explanations, which would destroy, in a great measure, its conciseness, one of its chief recommendations. The term POISON is very indefinite indeed, and considered medicinally, there is scarcely a substance commonly called poison which might not be occasionally a very efficient medicine: and as to the doses, it should be remembered that many things are poisons to one person, which are perfectly harmless to another. The best work on poisons which we have seen, is, *Black's*

Orfila on Poisons, a small volume which ought to be in the hands of every one. To this we refer our correspondent; and also to the FAMILY CYCLOPÆDIA, by MR. JENNINGS, which will shortly appear, and in which the subject of Poisons is copiously treated.

On the Analogy between Light, Heat, Electricity and Magnetism.

To the Editor of the London Journal of Arts and Sciences.

SIR,

LIGHT is the grand principle of life, and vegetation; we know a few of its properties. It is the cause of vision, of colours, de-oxidation, inflammability, &c. It is fixed in certain bodies; its velocity is 200,000 miles per second, consequently, if the particles of light were $\frac{1}{1,000,000,000,000}$ part of a grain in weight, they would immediately destroy the eye.

It will be a difficult matter to prove, that light, caloric, electricity and magnetism are the same, or modifications of the same substance; yet such an hypothesis by no means errs from the known simplicity and power of the law of nature. I shall merely represent in a table, the several resemblances which these substances bear to each other, and leave the result to the candour of the reader.

Many things in this table will be derived from actual observations and experiments, made with a view to illustrate the subject, others will be evident or known facts, and what cannot be proved will be left blank.

I am, Sir,
Your's, &c.
H. C. JENNINGS.

London, Oct. 25, 1820.

LIGHT.	CALORIC.	ELECTRICITY.	MAGNETISM.
Emanates from the Sun.	Ditto.	(Is probable.)	Do. as has been lately proved by experiment]
Travels with great velocity.	Ditto.	Ditto.	Ditto.
Penetrates certain hard bodies.	Ditto.	Ditto.	Ditto.
Does not add sensible weight to bodies.	Ditto.	Ditto.	Ditto.
Produced in some cases by friction.	Ditto.	Ditto.	Ditto.
Transmitted in direct lines.	Ditto.	Ditto.	Ditto.
Produced by percussion.	Ditto.	Ditto.	Ditto.
An inconfinable body.	Ditto.	Ditto.	Ditto.
Detained in some peculiar bodies in a latent state.	Ditto.	Ditto.	Ditto.
Produced by Electricity.	Ditto.	—	Ditto.
Acts on points most intensely.	Ditto.	Ditto.	Ditto.
Produced by decomposition.	Ditto.	An agent in producing decomposition.	Decomposition suspends magnetic action
Powerful action on some bodies.	Ditto.	Ditto.	Ditto.
Produced by Caloric.	Produces light.	Produces light.	Light of the Aur. Bor. acts on the magn.
Acts in Vacuo.	Do. Power increased in vacuo.	Ditto.	Ditto.
Transmitted by water,	Do, conducted by water.	Conducted by water.	Conducted by water.
—	Fixed in the Earth.	Ditto.	Ditto.
Readily produced.	Ditto.	Ditto.	Ditto.
Produced by some combustible bodies.	Ditto.	Produced by some combustible bodies.	—
—	Pervades the earth.	Ditto.	Ditto.
Produces Caloric.	—	Ditto.	—
Produces prismatic colours.	Ditto.	Ditto.	Violet ray produces magnetism.
Known in an active and latent state.	Ditto.	Ditto.	Ditto.
Particles repel each other.	Ditto.	Ditto.	Repels and attracts.
Possesses deoxidating power.	Ditto.	Ditto.	Oxidation destroys magnetic action.
May be seen	Ditto.	Ditto.	Can be seen only by its effects.
—	May be felt.	May be felt.	—
—	—	May be tasted	—
Necessary to vegetation and life.	Ditto.	Probably necessary to life and vegetation, but certainly useful in many diseases.	Very useful to man.
—	Cause of fluidity.	Increases the fluidity of liquids.	—
Decomposes certain bodies.	Ditto.	Ditto.	—
Can be procured in a very concentrated state.	Ditto.	Ditto.	Ditto.

Note by the Editor. We understand that this gentleman considers the sun to be an enormous engine of electricity; in plain words, a large electrical machine, constantly throwing out floods of that peculiar fluid, which, acting on the different substances of the terrestrial globe, produces the various phænomena of electricity, light, caloric and magnetism. But there is scarcely any end to theorizing on such subjects: might not the whole of the phænomena in the preceding table be referred to one simple modification of matter—MOTION?

On the Safety Valve.

To the Editor of the London Journal of Arts and Sciences.

SIR,

IT has been generally presumed that all explosions which have taken place in steam boilers, happened in consequence of the ill construction or inaction of the apparatus, improperly called the *safety-valve;* which till lately was invariably placed at the command of the person attending the engine, and thereby dependent on his care, as well as so constructed that he could add, or take from it, what weight he pleased.

The safety valve being considered the most important appendage to a steam-engine, and that on which depends the durability of the boiler, as well as the safety of those attending it, many persons of late have been induced to recommend the addition of two safety-valves, one accessible and the other inaccessible to the man attending the engine, since most accidents have arisen from his rash conduct in overloading the valve.

Although this may be highly expedient, yet it cannot be fully depended upon as a perfect security against danger; as all metal valves have hitherto been liable to be impeded in their action by the expansion and contraction, oxidation, &c. of the metals, especially the inaccessible valve, which, being generally loaded somewhat higher than the accessible one, is consequently not so often in action, and being out of sight is more liable to the above accident.

Being myself engaged in some experiments on steam power, whereby an explosion might have been attended with very fatal consequences, I was induced to take the subject of a preventive into consideration, the result of which was the following invention, as an accessible valve, upon which I have made several experiments, and have, as yet, found it fully to answer the purpose: though, no doubt, among practical engineers it may be capable of future improvement.

A, is a cast iron tube, about nine inches long, which is to be inserted within a boiler of the ordinary construction at the top part, inserted as far as B, B; C, is a valve which may be either flat, conical, or spherical; that in the figure, Plate XVII, fig. 6, is spherical, which form I should recommend to be used to the boiler of a steam-boat, though perhaps a flat valve might be preferable to the boiler of a stationary engine on shore. The concave part, or cup of the valve, is formed of cast iron, and the convex part or ball, of an alloy of bismuth, lead and tin, so proportioned as to fuse at any required temperature above 212°. The reason of my recommending the cups to be of cast iron, is, in consequence of that metal being less disposed to adhere to the composition of which the convex part of the valve is formed in the event of its partial fusion. The weight, D, may be placed either within the tube, or suspended from the bottom, as shewn. Now, as it is well known that steam increases in heat as it increases in expansive force, should the common action of the valve be impeded, as soon as the steam arrives at a degree of pressure, and consequently of heat, equal to that at which the compound metals melt, the convex part of the valve would give way, and the steam make its escape through the pipe at E, having its exit on the outside of the boat or building. But, as it is a matter of some difficulty to obtain the metals perfectly pure, especially in any quantity, I think it advisable to omit giving any table of proportions for mixing the alloy, which if they were not perfectly pure would only lead to error, and have therefore adopted the following mode of obtaining the just proportions. In order to adapt this apparatus to a boiler, required to be worked at about five pound pressure upon every inch, let the boiler be first submitted, by cold water pressure to eighteen or twenty pounds per inch, by way of proving its strength, then let a thermometer be so adapted that the ball may be within the boiler, for the purpose of noting the increase of temperature. The steam being raised in the boiler to a pressure of nine or ten pounds per inch, the degree of temperature must be accurately taken; then let eight parts of bismuth, five of lead, and four of tin, be melted together, and lead added, till, by applying a thermometer, the metal is found to set at a degree of heat corresponding with that in the boiler. Of this alloy the spherical part of the valve is to be composed, and from the above mode of experimenting upon the compound, full dependence may be placed that it will certainly give way and open the valve when the steam rives at that pressure which would endanger the boiler and render it liable to explosion.

Doubts have been suggested that, by the steam escaping through the valve C, a quantity of water would accumulate in the tube, by the condensation of the steam, and thereby prevent the valve from fusing in the event of the steam arriving at that pressure at which it ought to give way. I have however found, by repeated experiment, that the tube, A, being always considerably hotter than the boiling point, the condensed water evaporates as fast as it falls into the tube.

I am, Sir, yours, &c.
W. HOLLINSHED, Jun.

King-Street, Seven Dials.

Arctic Expedition.

The anxiety which has so long occupied the public mind for the safety of these hardy adventurers, is at length relieved by their arrival in a British Port. The two discovery ships Hecla and Griper, under the command of Lieutenant Parry, left England in May 1819, and proceeded to Baffin's Bay. The ice, in impenetrable shoals, rendering the western shores of Greenland inaccessible, the vessels tacking in latitude 74 N. and proceeding upon that parallel, entered the inlet called Lancaster Sound, the second week of August. Here the sea was perfectly open and the channel from twenty to twenty-five miles wide, with no appearance of current, and the soundings as deep as in the Bay of Biscay. The ships proceeded nearly due west, and arrived at that part of the sound which was considered by Captain Ross to be its termination, and by him called Croker Mountains. The inlet however was found to continue to the westward, and, at about 90° degrees of W. longitude, on the northern side of the channel commenced a range of islands and broken land which was named the *Georgian Isles.* A very considerable opening to the southward now presented itself, and the ships proceeded up this inlet for the distance of about an hundred and fifty miles, which was denominated *Regent's Inlet.* Finding, however, its course inclining towards the S. E. and probably leading into Hudson's Bay, they returned to Lancaster Sound, and pursued their researches in a direction nearly due west. The Georgian Isles continued to extend themselves on the northern side of the sound, and the navigators, having in the first week of September arrived at the furthest westerly point of land 113° W. they called it *Bounty Point*, having proceeded sufficiently far to entitle them to the bounty offered by Government.

The approach of winter now induced them to search for a convenient haven, and steering a little to the N. E. they discovered a commodious bay, with five fathom water, in which the ships were laid up for the season, latitude 74° 47′ N, longitude 110° 47′ W. Huts were here erected upon the shore, which was called *Melville Island*, for the residence of the ship's company during winter; and every preparation made against the dreary and inclement season of this inhospitable clime. By the middle of September the winter set in, though the sun continued more than fourteen hours out of the twenty-four above the horizon. At this period the thermometer fell considerably below zero, and the effect of touching a piece of metal was exactly similar to the sensation of burning. The greatest possible precaution was necessary in using the transit instrument, which attracted the heat from the face and hands as they approached it. The open air was however perfectly supportable, and respiration in no respect difficult.

In this latitude upon the 3rd of November the sun is in the horizon at noon, but by the very great refractive properties of the dense atmosphere, it continues to be visible (for a very short time about noon) until the 20th of November, after which the sun is no more seen for about eight weeks. During this dreary season of darkness, the officers and crew amused themselves within doors, chiefly with games and dramatic performances: for exposure to the open air now became dangerous. In one instance, an accident having set fire to the hut of Captain Sabine, the astronomer, his servant, anxious to extinguish the flames, inadvertently rushed into the open air, and in a few minutes his hands became so perished that he ultimately lost three fingers of one hand and two of the other. In January the thermometer sunk to 52° degrees below zero, the chilling wind rendered it impossible to endure the intense cold of the open air. At this season the darkness was considerably relieved by a resplendent moon, which, during two lunations, shone without setting, except for three or four days about the middle of December and January, which was the time of new moon. Astronomical observation at this season was impossible; and indeed the expedition was unprovided with a telescope, except one of the small power of 20 attached to the transit instrument. It must appear singular that Government should not have supplied the instruments necessary for scientific investigation; but it is no more strange than true that all the instruments which accompanied the expedition were purchased at the cost, or procured from the friends of the adventurers.

Having been sixty days without daylight, towards the latter end of January the sun began again to appear for a short time about noon; but the intensity of cold would not permit the ship's company to quit their huts. The duration of daylight rapidly increased until the latter end of April, when the sun performed its circuit entirely above the horizon and produced perpetual day. Excursions were now taken on the island, and several huts discovered with fragments of clothing, which appeared to have belonged to Esquimaux hunters, but no human being was seen. Many rabbits and some lean deer, as well as a nondescript animal, were found, and an abundance of partridge. Beyond Melville Island toward the north another island was seen, and called *Sabine Island.* The frost however was still intense and the ships were fast bound in the bay. A small quantity of grass and moss with a few plantsappeared to be the only native produce of the Isle. Experiments were made with respect to vegetation, and the rapid germination of some of our common garden seeds was truly surprising.

The ice breaking up in the beginning of August (after having confined the ships for eleven months), enabled them to proceed upon their voyage of discovery, and steering west upon the parallel of 74° past Bounty Point, before mentioned, they found themselves in what appeared to be the Arctic Bason; but having proceeded as far as 115° W. longitude, the further progress of the ship toward the W. and N. became impeded by impenetrable barriers of ice. An appearance to the southward, which the sailors called the looming of the land, induced a strong belief that *Hearn's Islands*, discovered in 1771, was not far distant, particularly as their precise latitude is not satisfactorily determined.

The summer, or season of open sea being confined to about five or six weeks, that is, August and part of Sepduced, all of which must be identical, dot for dot, and line for line; and upon the score of economy, one steel plate would produce fifty thousand proof prints, the last of which should be equal to the first in beauty, while an ordinary copper plate would become nearly obliterated by giving one thousand prints. The cost of the steel plates, taken from the first die, would not exceed one pound each; the cost of the common copper plates used by the Bank is about four pounds. With regard to expedition, we have seen a press in action, which produces sixty-four notes per minute, and we are happy to add, that the method is now in very extensive operation, supplying many of the provincial Banks throughout the United Kingdom.

The plate which we now present needs no explanation; it contains a specimen of such kind of work as may be incorporated into a Bank Note; and at the back of the note is a specimen of curious excentric scroll work. A design being approved and adopted, it is utterly impossible for any person, even the inventors themselves, to produce an identical copy; or, indeed, such an imitation as could not be detected immediately upon inspection. We do not consider it necessary to enlarge further upon its merits, and hope that the public will ere long feel its advantages, by the production of a national paper circulation upon this plan; or if any better can be devised it will have our hearty concurrence. This method is making its way extensively in the book trade, and is expected to be adopted among the potteries. So far is it from tending to injure artists, that we can now use the most tasteful and exquisite engravings to the cheapest production with advantage so that it will; tend greatly to the advancement of the arts and manufactures of the kingdom.

Gas Tubes.

MR. PHIPSON, of Birmingham, in order to obviate the effects produced by the action of gases on copper or brass pipes, through which they pass, has adopted the plan of lining them with lead. A tube is formed of rolled copper, by drawing it through a plate, and the edges are soldered together, so as to form a safe joint, the superfluous solder is dressed off, and the tube again drawn; a piece of lead pipe is then drawn through a plate on a mandrill, of the diameter of the tube required, and placed within the copper pipe; then, by passing through it a conical mandrill attached to a rod, the lead pipe is forced against the inner surface of the copper tube, so as to leave them in perfect contact; or sometimes a lead pipe is prepared on a mandrill, of the diameter of the tube required, and a copper pipe, already soldered, drawn over it; they are then passed both together on a mandrill through a draw-plate, so as to bring the two into complete contact. The lead pipe is proof against the action of gas, and the copper pipe, at the same time that it supports and defends it, makes a better appearance.—*Journal of Science.*

Polytechnic and Scientific Intelligence.

GREAT BRITAIN.

Society of Arts.

THIS Society commenced their sittings for the present session, on the first of November. Various communications upon different branches of the arts were received during the recess, and referred to the respective committees for investigation. Several subjects in the class of mechanics have also been considered, but no rewards have yet been adjudged.

We are sorry to be obliged also to observe, relative to the proceedings of this society, that it has been chiefly engaged during the month of November, on a subject highly derogatory to it as a body, and not less injurious to the general interests of the arts, for the ENCOURAGEMENT of which this society was expressly organized. Judging from the spirit of those resolutions which we are about to communicate to our readers, we are obliged to conclude that *corruption* of some kind or other pervades the acting members: and that, unless some better spirits descend and animate their proceedings, it will soon become one of those narrow corporations which the longer it exists, the weaker and more imbecile it must become.

On the second of November a notice from the Committee of Correspondence was sent to the members to meet on the eighth: one of the chief subjects on which they were to be engaged, was "*To consider whether any means could be adopted to prevent any persons from publishing the descriptions of Inventions rewarded by the Society before they have appeared in the Volumes of the Transactions.*"

After various debates the Committee of Correspondence and Papers, the Committee of the Society for the ENCOURAGEMENT of Arts, Manufactures and Commerce, to whom the above question was referred, came to the following resolutions:—

Resolved,—*That it is the opinion of this Committee, that the Society is fairly entitled to be the first publisher of the subjects rewarded by it; and that it is highly improper for any member of this Society to avail himself of* *the information which he has it in his power to obtain by his attendance on the Committees and Meetings of this Society by a prior publication, and thus very considerably lessening the value of the volumes of the Society's Transactions.*

Resolved,—*That it be recommended to the Society, that the following be hung up as a new Rule and Order, viz.*

That it is contrary to the intentions, *injurious to the* interests, *of this Society, that any matter submitted to this Society, and intended to be published in its volumes, should be previously published in any other journal. That any Member infringing the foregoing rule be expelled the Society.*

Passing by the manifest inconsistency of the Society being the publisher of the *subjects* rewarded by it, (we presume they mean an *account* of the subjects,) we ask, in the name of common sense, whether the intention of every member of the society attending the meetings, is not, or ought not to be, chiefly, for the purpose of obtaining information; and if for obtaining information, is it not also quite natural, liberal and proper, that he should diffuse that information to others, whether it be by communicating it to a public journal, or in any other manner. But it seems the *interests* of the society are injured. The INTERESTS of the society! How long, we take leave to ask, have the interests of this society been different from the interests of the public at large? This society was instituted for the express purpose of encouraging the arts, manufactures and commerce, and chiefly by giving *rewards*, for new and meritorious inventions. What, therefore, can be more astounding than this novel doctrine about the *interests* of the society? The interests of the society are, or ought to be, the interests of the public; and being a public body, the society ought not to desire to receive any *profit* from the publication of its volume; on the contrary, it would be much more liberal, and in character in them too, to give away their volumes, in a discreet and useful manner of course. And so far from taking every means to prevent a public notice of what occurs in their society relative to the improvements in the arts, if they act up to their pretensions, they ought not only to be much obliged to every one who contributes to the diffusion of such information, but they ought themselves to publish notes or memoranda of their transactions very often, in order that the diffusion of knowledge may be as rapid, general, and useful as possible.

The *annual* publication of their volume, which sometimes seals up a useful discovery for more than a year and a half, is too tardy a method of communicating such information to us who are on the spot; and, besides, we doubt exceedingly whether the notices of the subjects of the volume which appear some time previously in the public journals, do not contribute to the sale even of the volume itself. And then, the expulsion of the member for the great crime of publishing the information which he has acquired at the meetings of this society! Surely the spirits of the Spanish Inquisition, driven from that country, have taken up their abode at the Adelphi!

We, therefore, call upon all the right honourable and honourable, the L.L.D.'s, F.R.S.'s and the other liberal and learned members of this society, to interfere and save it from the everlasting disgrace with which it is threatened. For should the society adopt the resolutions recommended by their committee, it will be more appropriately denominated the *Society for the* DISCOURAGEMENT *of Arts, &c.*

Astronomical Society of London.

Nov. 10. This society met for the first time this season, and was very numerously attended. A communication was made respecting the occultation of the pleiades by the moon, which will take place at every lunation, for the next three or four years: and a map of that remarkable cluster of stars was exhibited. Some valuable tables were presented by Mr. Groombridge, for the reduction of observations of the fixed stars. And a paper was read from M. Gauss, of Gottingen, on the new repeating circle which has been affixed in the observatory of that place. It was made by Reichenbach, of Munich, and the telescope of it is so powerful as to show the pole star, at mid-day, by *reflection in water*. The next meeting of the society will be on the 8th of December.

Royal Geological Society of Cornwall.

At the anniversary meeting of this Society, at Penzance, on the 3d of October, the following papers were read:—

On the Temperature of Mines, by Dr. **Forbes**; whence we learn that the maximum temperature in the deepest mines of Cornwall (1300 to 1400 feet) is about 80 degrees of Fahrenheit, or 28 degrees above the mean of the climate; and that the usual medium of temperature is from 70 to 80. The causes for such a high temperature do not, however, seem to be satisfactorily explained.

Another paper on the same subject, by Mr. R.W. **Fox**, was also read. Mr. Fox, from his experiments, concludes that the temperature of the earth progressively increases as we descend, nearly in the ratio of one degree of Fahrenheit for every sixty or seventy feet.

Two papers by Mr. **John Hawkins** were also read:

one on the Alteration of Primitive Strata in Cornwall; the other on the Intersection of Lodes and the inferences to be deduced therefrom.

Two also were read by Mr. JOSEPH CARNE: one on some singular Lead Veins lately discovered in Cornwall; the other on Cornish Petroleum. By the former paper we learn that the very productive mine of Sir C. Hawkins, at Newlyn, yields more than 1000l. monthly, in silver alone.

A paper by Mr. BOASE, on the Cultivation of Geological Science in Cornwall, was in the usual clear, eloquent, and forcible manner of that gentleman.

Royal Irish Academy.

The 13th volume of the Transactions of this Academy has just been published. It contains the following articles:—

On Voltaic Electricity. By the Rev. T. A. ROBINSON.

On the Changes of the Human Skeleton at different Periods of Life. By W. WALLACE, M.D.

Method of computing Astronomical Refractions near the Horizon. By Professor BRINKLEY.

The Inscription of a regular Polygon of 17 *sides in a Circle.* By the Rev. FRANCIS SADLER.

Method of correcting the approximate Elements of the Orbit of a Comet. By Professor BRINKLEY.

An Essay on the Life and Writings of Ossian, with an Analysis of his Cynegetics. By the Rev. W. H. DRUMMOND.

Remarks on a Brass Medal of our Saviour found at Cork. By H. J. M. MASON.

Conjectures on the Origin of the Oriental Manner of Counting from Right to Left. By N. S. SANKEY.

Observations which accompanied a Hebrew Medal submitted to the Inspection of the Academy by the Rev. R. WALSH.

Description of a rich and ancient Box, containing a Latin Copy of the Gospels, found on a Mountain in the County of Tipperary. By H. M. MADEN.

Description of a Drawing in the Red Book of the Exchequer of Ireland. By the Same.

On the Cause of the continuous, Rumbling Noise of Thunder.

Many philosophers have attempted to account for the continuous rumbling of thunder, but we are not aware that it has yet been explained in a satisfactory manner. The first explosion is doubtless produced by the electric fluid coming in contact with atmospheric air mixed, or in contact with, hydrogenous gas; but why, after the first report, many others should frequently follow, yet remains to be explained. We cannot admit them to be, in general, echoes of the first report, although it is possible that echo may occasionally have a part in these rumblings. However, we have been favoured by Mr. JENNINGS, with a much more rational solution of the rumbling of thunder. —The following is taken from the article THUNDER in the FAMILY CYCLOPEDIA, by this gentleman, now in course of publication.

"All liquid as well as gaseous bodies in passing through other liquid or gaseous bodies with which they do not intimately combine, or in which they do not dissolve, assume a globular form. The hydrogenous gases which arise from various decomposing processes at the surface of the earth, ascend in the atmosphere to a certain height, according to their specific gravities, and float about in masses or globules of greater or less dimensions, till, coming in contact with the electric fluid, an explosion is the consequence, water is formed and descends frequently in torrents to the earth. If only one of such masses or globules should explode, we may conclude that no other was near it; but when a series of continuous explosions takes place, the conclusion is, that a series of insulated masses or globules of hydrogenous gases, more or less large, was in the neighbourhood of the first mass which exploded; the first explosion extending to the second, and so on as long as any globules of gas are within the sphere of the igniting effect of the previous explosion."

Mr. Jennings was led to this conclusion from the following experiment.—He took steel filings and added to them a certain portion of sulphuric acid and water in the manner usually directed for obtaining hydrogenous gas. This mixture he placed in an open stone ware vessel; the hydrogenous gas escaped in bubbles at the surface; when the bubbles were moderately large, and at the same time numerous, he applied a lighted taper to one of them at the edge of the vessel, and the rumbling of thunder in miniature by continuous explosions was immediately produced. If the vessel was covered so as to prevent, in some degree, the escape of the gas, and after a short time a taper being applied to the edge of the vessel, one explosion only took place: in other words the different bubbles of gas had become one bubble, and filled the whole of the upper part of the vessel. This experiment is not unattended with danger, and therefore it ought to be most cautiously made.

Thermometer an Indication at Sea, of the Approach to Land.

It appears from a paper in the sixth number of the *Edinburgh Philosophical Journal*, by Mr. Livingston, containing an account of observations made in a *Voyage from New Orleans to Gibraltar*, in August, September, and October, 1818, that in some parts of the ocean, particularly in the current of the Gulph of Florida, an approach to land was constantly attended by a falling of the thermometer.

That the nearness of *land* or *soundings* in the Gulph of Mexico and the straits between Cuba, the Tortuga, and Thartyrs reefs had no effect on the thermometer; but that as soon as the ship passed Cape Florida, the falling of the thermometer indicated correctly their approach to land, and the same indication held good along the American coast, as far as the 36th degree of latitude. That conceiving, whilst passing through the Strait of Florida, the ship to be on the edge of the bank of soundings, Mr. Livington found the thermometer had sunk from 85 to 82 in the space of two hours; that the ship tacked immediately off shore and it soon rose again. From lat. 38, 56 and long. 62,39, the height of the mercury gradually decreased until it seemed to rest between 74 and 76 degrees; but from longitude 44 to 33° w. running on the parallel of about 40°, or nearly so, it was extremely variable; and in lat. 39,40 long. about 34°, 45' it steadily sunk to 72½°. This induced Mr. L. to suspect the vicinity of some unknown shoal, particularly from the proximity of the volcanic Azores. Near the islands of Fayd and Pico, and in the strait between the latter and St. George's, the mercury fell to 70½; but between these islands and St. Michael's it again rose some degrees. In 17 fathoms water, when the ship was at anchor in the road of the city of *Ponta del Gudo*, in St. Michael's, it stood at 70°, and about two leagues in the offing it rose to 72, from thence it gradually subsided to 60°, at which it continued until the sea began to lose the deep azure of the ocean, and assume the dark olive green tint, denoting soundings, when it immediately fell to 66°, though then no bottom could be found with 110 fathoms of line. Abreast of Cape St. Vincent, at about four miles distant, it only stood at 61°; but rising as they left the Portuguese coast steering for the entrance of the strait of Gibraltar, it again reached 69°. In working through the straits of Gibraltar, it ranged from 60 to 66°, falling as they approached either the Spanish or Barbary shores.

Uses of Salt in Horticulture.

We call our readers' attention to a paper in the *Journal of Science, &c.* by Mr. PARKES, on this subject, which is deserving of attention. We can only enumerate the heads under which it is treated. 1st. That common salt when applied in due proportion, has the effect of promoting the health and growth of vegetables. 2ndly. That it has the property of rendering fruit trees and esculent plants unfit for the food or the habitation of worms and insects. 3rdly. That common salt is one of the most efficacious substances that can be employed in a garden, for the destruction of worms and insects. And, 4thly. That common salt may with material advantage be likewise used for the destruction of weeds or other obnoxious vegetables.

Test for Copper.

A concentrated solution of copper being dropped into a newly-prepared tincture of guiacum wood, the mixture instantly assumes a blue colour. This effect does not take place when the solution is very weak; but even then, by the addition of a few drops of prussic acid, a blue colour is immediately developed of great purity and intensity. This colour is not permanent, but soon passes to green, and at length totally disappears. Or, in the place of prussic acid, distilled laurel-water, or that of plum or black cherry kernel, may be employed. In using tincture of guaiacum as a test for copper, care must be taken that no other bodies are present which turn it blue.

Artificial Gems.

The following recipes are given in the *Journal of Science*, &c. for forming artificial gems: The basis of all these gems is a paste, which is composed of silex, potash, borax, oxide of lead, and sometimes arsenic. All the articles should be as pure as possible. Hessian crucibles are better than those of porcelain. A potter's or a porcelain furnace may be used, and the fusion should be continued for 24 hours; the more tranquil and continued it is, the denser the paste, and the greater its beauty. The four following recipes have given good paste.

No. 1.	grains.
Rock Crystal	4056
Minium	6300
Pure Potash	2154
Borax	276
Arsenic	12

No. 2.	
Sand	3600
Cerusse	8508
Potash	1260
Borax	360
Arsenic	12

No. 3.	grains.
Rock Crystal	3056
Minium	5382
Potash	1944
Borax	216
Arsenic	6

No. 4.	
Rock Crystal	3600
Cerusse	8508
Potash	1260
Borax	360

TOPAZ.

Very white paste	1008
Glass of antimony	43
Purple of Cassius	1

or

Paste	3456
Oxide of iron (Saffron of Mars	36

EMERALD.

Paste	4608
Green oxide of pure copper	42
Oxide of chrome	2

SAPPHIRE.

Paste	4608
Oxide of cobalt	68

This mixture should be carefully heated in a Hessian crucible, and remain 30 hours in the fire.

AMETHYST.

Paste	4608
Oxide of manganese	36
Oxide of cobalt	24
Purple of Cassius	1

RUBY.

It often happens that the mixture for topaz gives only an opaque mass, in thin plates of a red colour. One part of this substance and 8 parts of paste fuzed for 30 hours, yield a yellow crystal paste, fragments of which, fuzed by the blow-pipe, give the finest possible imitation of rubies.

Or,

Paste	2880
Oxide of manganese	70

form rubies.

BERYL, or AQUA MARINA.

Paste	3456
Glass of antimony	24
Oxide of cobalt	1½

SYRIAN GARNET, or CARBNCLEU.

Paste	512
Glass of antimony	256
Purple of Cassius	2
Oxide of manganese	2

In all these mixtures, the substances should be mixed by sifting, fused very carefully, and cooled very slowly, being left on the fire from 24 to 30 hours.

On the Flexibility and Strength of Stones.

An ingenious paper by Mr. TREADGOLD, on the *Flexibility and Strength of Stones,* has lately appeared in the *Philosophical Magazine.* In making his experiments Mr. T. supported the piece of stone at each end upon iron supports; the scale for the weights was suspended from the middle between these supports; and a silken line attached to the middle, moved a lever index, which multiplied the depression so as to render a very small quantity visible. The scale and its apparatus weighed ten pounds; the weights used were cubical pieces of iron cast on purpose, weighing ten pounds each. The weight in the scale was increased by 10lbs. at a time laid on as softly as possible, and the index was always allowed to become stationary, before another addition was made to the weight. The time elapsed before the index became stationary was not observed, but it always increased sensibly towards the end of the experiment.

A piece of white statuary marble of a very regular texture, free from veins, or other apparent defects, was tried at three different lengths; the short specimens were fragments of the long one. The piece was not perfectly uniform in breadth and depth, but the dimensions at the places of fracture are given; the specific gravity of the marble was 2,706, and it absorbed $\frac{1}{1300}$ of its weight in water.

Distance between the supports inch. 30 Depth ..1,075 Breadth ..1,075		Distance between the supports.. inch. 15 Depth ....1,08 Breadth ...1,05		Distance between the supports inch. 14 Depth....1,075 Breadth ..1,075	
Weight	Depression	Weight	Depression	Weight	Depression
10lb	.02 in.	10lb	.005 in.	10lb	not sensible
20	.045	20	.01	20	.005 in.
30	.06	30	.012	30	.01
40	.08	40	.015	40	.012
50	Broke	50	.017	60	.015
		60	.02	70	.02
		70	.021	90	.025
		80	.025	100	.027
		90	.03	110	.03
		100	.035	120	.034
		110	broke	130	.037
					and broke

There is some difference in the quality of the *Portland stone* used in London; the best and strongest kind is of a browner colour than the rest. The specimen with which the following experiments were made, was of the brown variety, and of a regular texture, without apparent defect. The length between the supports was 24 inches, the breadth 2 inches, and the depth 1.45 inch. The specific gravity of this stone was 1.113, and it absorbed $\frac{1}{16}$ of its weight of water.

Weight	10 lbs.	Depression	01 inch
	20	— —	015
	30	— —	02
	30	— —	022
	40	— —	025
	60	— —	0275
	70	— —	03
	80	— —	032
	90	— —	035
	100	— —	037 and broke.

The next trial was made with a pieceof white siliceous sandstone from Lord Keith's quarry, at Long Annet. Its specific gravity was 2.212 and it absorbed $\frac{1}{276}$ of its weight in water. The texture regular with small scales of mica distributed through it. The distance between the supports was 18 inches; the breadth 1.45 inch, and the depth 1.525 inch.

Weight	20 lbs.	Depression	015 inch.
	30	— —	02
	40	— —	022
	50	— —	025
	60	— —	03
	70	— —	038
	80	— —	045
	90	— —	05
	92	— —	broke.

The following table contains the results of experiments on the *lateral strength of stones*, in which the flexure was not ascertained. With the exception of one of the Long Annet ones, they were laid with their natural beds horizontally.

KIND OF STONE.	Dist. between the Supports.	Breadth Inches.	Depth Inches	Wt. that broke the Piece.	Weight of the Cub. Foot.
Dundee Stone	14 in.	1.45	1.5	414 lb	163.8 lb
Craigleith Stone . .	14	1.55	1.55	137	147.6
Hailes Stone	14	1.55	1.5	123	134.6
Long Annet Stone .	9	1.525	1.45	166	138.25
Do. another specimen	7	1.55	1.55	233	....
Portland Stone . . .	12	2.07	1.55	270	132
Bath Stone	5.5	1.0	1.0	58	123.4

The specific gravity of the Dundee stone was 2.621, and it absorbed only $\frac{1}{511}$ of its weight of water; of the Craigleith stone 2.362; it absorbed $\frac{1}{63}$ of its weight of water.—It should be observed, that the Dundee stone was from the Mylne field quarry, near Dundee, and that the specimen in the above experiment was superior both in fineness, texture, and density, to the kind usually obtained from that quarry.

Dry Rot.

Colonel Gibbs of the United States, is of opinion, that the reason why the dry rot is so much more frequent now than it was formerly, is, that, in consequence of the great consumption of wood during the last century for wood and architectural purposes, all the old wood has been consumed, and nothing is now left for these purposes but comparatively young wood, in which the alburnum bears a much greater proportion to the heart than in old trees. Several ships built at Boston have been salted or filled in between the timbers with salt while on the stocks, and after the lapse of ten or fifteen years, the timbers have, in every case, been found perfectly sound. A large ship, which had been salted (fourteen years old) required repairs, new decks, and new iron work. On examining her, the result was, that the timber and plank were found completely sound in every part. A vessel of 500 tons required 500 bushels of salt, and, two years, after being built, 100 bushels were added to fill up the space of the dissolved salt.—*American Journal of Sciences, &c.*

On the Ventilation of Mines.

Dr. M. Sweeny has published some observations on Thomson's Annals, concerning the Ventilation of Mines, which are deserving attention. He remarks that, although the safety lamp of Sir Humphry Davy has enabled the miners to descend into an explosive atmosphere with impunity, yet when we reflect that only a wire gauze, liable to various accidents, screens so many from destruction, we must admit that every precaution should be taken to prevent the accumulation of the noxious gas. He therefore proposes *blowing engines* for the ventilation of mines. The water escaping from the crevices of a mine could be conducted by pipes to supply these engines; the air extracted could be conveyed from them up the shafts by tubes, and atmospheric air would descend to occupy its place. In this way, even carbonic acid gas may be got out. It is well known that gas can be got out of a mine by a tube communicating with the under valve of a large bellows; but if by the act of getting out the gas we could raise the water out of the mine, it would be a matter of some importance. It may be thus accomplished: the mine tube coming from the valve of the bellows should divide into a number of branches, each branch near its commencement being furnished with a cock. We will suppose that the tube coming from the bellows divides into three branches; and for the sake of perspicuity shall call what conveys off the gas, *tube*, and what conveys of the water, *pipe*. If there be an air-tight box or cistern, placed about 30 feet above the level of the water, in the mine, furnished with a pipe descending from its bottom into the water below, it is evident, that if we exhaust the air out of this cistern, the water will descend up the pipe and will fill the cistern, and may be prevented from returning by valves placed in the pipe: by this plan we get the water up one lift. Now to get it up a second, the cistern should be provided with a valve on its top, opening upwards; when this valve is filled up, the atmospheric pressure is on the surface of the water in the cistern, will force it up a second similar pipe (which runs through the water from near its bottom) to a second similar cistern, placed about 30 feet from above the bottom of the first, provided an exhaustion is taking place in the second cistern. By this process the water may be raised from the second cistern to the third, and from the third to the fourth, and so on to any height.

The means of exhausting the cisterns of air now remains to be explained. We suppose the large bellows to be at work, and that the cocks of all the branches of the main tube, coming from the valve of the bellows, are shut, except the cock of the first branch. The first branch descends down to the top of the first cistern; the exhaustion by means of the bellows takes place through this branch, consequently the water rises to fill the first cistern. When this cistern is full, the cock of the first branch is shut; and that of the second branch (which descends down to the top of the second cistern) is opened: of course an exhaustion takes place, and the water rises from the first to fill the second cistern, the valve on the top of the first cistern being pulled up to allow of the atmospheric pressure; when the cock of the second branch is shut, and that of the third opened, the water can be made to rise from the second cistern in like manner to fill the third above it, and so on. Water raised from a mine, or any other water, provided there be some tube, may be employed for forcing gas from a mine, by a contrivance which Dr. M. Sweeny has explained, by the assistance of plates, to which those who desire more minute information will of course refer.

FRANCE.

Society of National Industry.

At a late general meeting of this society, the prizes proposed for this year were distributed.

A prize of 1,200 francs was presented to M. Chevenard, and 1,000 francs to M. Galteaux for improvements in the manufacture of carpets. Gold medals were also awarded to M. M. Apperl, of Paris, and, Quinlon of Bourdeaux, for their plans for the preservation of food.

The following new prizes were proposed: 2,500 francs for a machine to polish optical glasses; to be decided in 1821. 1,200 francs for the manufacture of bars of copper for the use of gold wire-drawers; to be decided in 1822. A prize of 3,000 francs for the manufacture of paper from mulberry leaves; to be awarded in 1824.

New Boat, or Bateau Rolant.

A boat of a new construction has lately been exhibited at Paris; the author of this ingenious contrivance wished to prove that by this machine we may with equal ease ride on land and navigate in water without the aid of wind or oars, and the motions of both elements are neither interrupted nor the velocity impeded. The whole secret lies in the moving power which makes it act, and remains constantly the same, except that the hinder wheel becomes the rudder when the boat is in the water. You may go with the wind favourable or against you; tack, ascend or descend a river at pleasure; the author asserts that, in calm weather, it would be possible to cross the channel rapidly, without fear of being overtaken by any boat. Trials of this boat has been made at Paris. After having proceeded for some time on the Seine, the inventor landed in his boat opposite the Quay d'Onay, and making his land apparatus act, he rolled the boat to the School of Natation, which was the end of his expedition.

Consumption of Smoke.

It appears that a paper on the consumption of smoke, written by M. de la Stire, was published in the *Memoirs of the Royal Academy of Sciences* for 1686, and that the method was invented by a Mr. DALESME. The smoke and flame were caused to descend by a tube through burning charcoal, whereby they were entirely consumed. See PARKS's patent in the present Number.

Academy of Sciences.

This academy has proposed a prize of 300 francs, to be awarded in 1822, for the best account of the following subject. To follow the developement of the triton or aquatic salamander through its different stages, from the egg to the perfect animal, and to describe the change which it undergoes interiorly, principally in respect to its osteology, and the distribution of its vessels.

The *Society of Medicine* of Paris have reproposed the question, "Can the existence of Idiopathic fever be doubted?" The prize for a satisfactory answer is a gold medal, or 300 francs. The memoirs are to be written either in Latin or French.

Expedition of Discovery.

The discovery ship Urania, under the direction of Capt. FREYCINET, was wrecked in February last, by striking against a submarine rock near the Falkland Islands. All the crew, and all the papers and objects acquired during the expedition were fortunately saved. M. Freycinet has, no doubt, arrived ere this in France, and we look forward with much interest to the publication of the account of his voyage. His magnetical observations will, we understand, be particularly valuable.

DENMARK.

Galvanism and Magnetism.

There has appeared in the *Bibliotheque Universelle*, for August, and subsequently in the *Literary Gazette*, in London, a curious paper entitled, *Experiments on the Influence of the Voltaic Pile upon the Magnetic Needle*, by Mr. J. Chr. ORSTED, *Professor of Natural Philosophy in the University of Copenhagen*. We can do little more, however, than call our reader's attention to this paper, and to the *Addition of the Editor*, also published in the Literary Gazette. The Editor of the *Bibliotheque Uni-*

verselle observes, that he has had occasion to repeat most of the curious experiments of Professor **Orsted** by means of the powerful voltaic battery of Professor De La **Rive**, consisting of 380 pieces of plate, six inches square.— Among a variety of other experiments he states, that by always placing the conducting wire, *vertically*, but alternately varying two circumstances: *first*, the relative position of the voltaic poles, and of the extremity of the wire, that is to say, making those poles answer, the positive to the top of the wire, and the negative to the bottom, and placing, in each of these positions, the wire, sometimes to the east and sometimes to the west of the south extremity of the needle; and *second*, repeating the same experiment, upon the northern extremity of the same needle, the following are the results:

First Series.

The *positive* voltaic pole being at the *top*, and the *negative* at the *bottom*, the conducting wire being retained in a vertical position.

The wire being brought to the *west* of the south pole, ...	attracts it.
To the *east*	repels it.
To the *west* of the *north* pole, . .	repels it.
To the *east*, ...	attracts it.

Second Series.

The *positive* pole being at the *bottom* and the *negative* at the *top* of the wire:

The wire being brought to the *west* of the *south* pole, ...	repels it.
To the *east*	attracts it.
To the *west* of the *north* pole, . .	attracts it.
To the *east*, ...	repels it.

The editor adds, every attempt to form a system on this insulated discovery would seem premature. It is a great fact, which will perhaps be connected with others already known, or hereafter to be discovered, and will multiply the relations between the magnetic, electric, calorific, and luciferous forces.—See the tables of Mr. C. Jennings, in our present number.

New Patents Sealed in 1820.

To Robert Frith, of Salford, in the county of Lancaster, Dyer, for improvements in the method of dyeing and printing various colours, so as to fix, or make the same permanent, or fast, on cottons, linens, silks, mohair, worsted and woollens, straw, chip and Leghorn.—Sealed, October 9th.—Six months for Inrolment.

To William Hervey, of Belper, in the county of Derby, Rope Maker, for certain improvements in the manufacture of ropes and belts by machinery, and also improvements in the said machinery.—Sealed, October 12th.—Two months for Inrolment.

To Richard Witty, of the parish of Sculcoates, in the county of York, Engineer, for certain improvements in pumps of various constructions, for raising and conveying water and other liquids, and also methods of applying a certain principle, or certain principles to ships' pumps, and for other useful purposes.—Sealed 16th October.—Six months for Inrolment.

To William Acraman the younger, and Daniel Wade Acraman, both of the city of Bristol, Iron Manufacturers, for certain improvents in the process of forming the materials for manufacturing chains, and chain-cables.—Sealed, 16th October.—Six months for Inrolment.

To James Richard Gilmour, of King-street, Borough of Southwark, and John Bold, of Millpond Bridge, both in the county of Surry, Printers, for certain Improvements on Printing Presses—Sealed, October 20th.—Six months for Inrolment.

To Thomas Priest, of Chigwell, in the county of Essex, Watch and Time-piece Maker, for a new and additional movement applied to a watch, to enable it to be wound up by the pendant knob, without any detached key or winder.—Sealed, October 20th.—Two months for Inrolment.

To Joseph Main, of Bagnio Court, Newgate-street, in the City of London, Esq. for certain improvements on wheel carriages.—Sealed, October 20th.—Six months for Inrolment.

To William Taylor, of Wednesbury, in the county of Stafford, Furnace-worker, for his invention of an improved furnace for the smelting of iron and other ores.—Sealed, October 23rd.—Six months for Inrolment.

To John Birkinshaw, of Bealington Iron Works, Durham, for certain improvements in the manufacturing and construction of a wrought or malleable iron railroad, or way.—Sealed, October 23rd.—Two months for Inrolment.

To Thompson Pearson, Ship Builder, South Shields, for an improvement on rudders.—Sealed, November 1st.—Two months for Inrolment.

To Samuel Wellman Wright, Upper Kennington, for an improved combination in machinery for making bricks and tiles.—Sealed, Nov. 1st.—Six months for Inrolment.

To William Swift Torey, of Deeping, St. James's, Lincoln, Farmer, for certain improvements on drills to be affixed to ploughs. — Sealed, November 1st.—Two months for Inrolment.

To Thomas Bonsor Crompton, of Tamworth, Lancaster, for an improvement in drying and finishing of paper by certain means hitherto unused for that purpose.—Sealed, November 1st.—Six months for Inrolment.

To Henry Lewis Lobeck, of Tower Street, in the City of London, Merchant, for an improvement in the process of making yeast.—Sealed, November 1st.—Six months for Inrolment.

To Major Peter Hawker, of Long Parish House, near Andover, in the county of Hants, for a machine, instrument, or apparatus, to assist in the attainment of proper performance on the piano forte, or other keyed instruments.—Sealed, November 1st.—Two months for Inrolment.

To William Carter, of St. Anges Circus, Old Street Road, in the county of Middlesex, Printer, for certain improvements in steam engines.—Sealed, November 1st.—Six months for Inrolment.

To James Ransom, of Ipswich, in the county of Suffolk, and Robert Ransom, of Colchester, in the county of Essex, Iron Founders, for an improvement upon an invention for which the said James Ransom has a patent,—June 1st. 1816, for certain improvements in ploughs.—Sealed November 28th.—Six months for Inrolment.

END OF VOL. I.

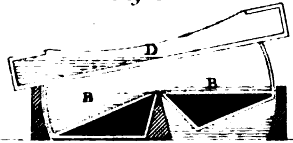
ERRATA TO VOL. I.

Page 68, line 1, for *hatchways* read *hatches.*
72, 7, for there is dispersion, read there is *no* dispersion.
154, 16, for Microscope, read *Micrometer.*
139, 4 from bottom, for *Cap. Stokes,* read Cap. *Stack.*
191, 10, for Mr. W. *Domford,* read Mr. *B. Donkin.*
300, 14, for *singularly,* read *similarly.*
302, 18, for metal *trunks,* read metal *tanks.*
361, 1, for *notion* read *motion.*
445, 3 from bottom, for open *air,* read open *sea.*

LONDON:
SHACKELL AND ARROWSMITH, JOHNSON'S-COURT, FLEET-STREET.

PLATE I.

Fig. 5.



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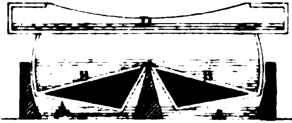

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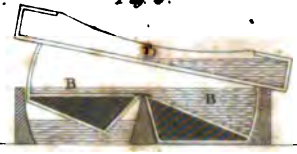
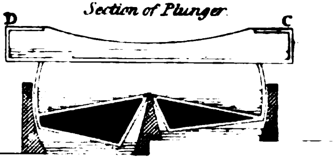


Fig. 4.

Section of Plunger.



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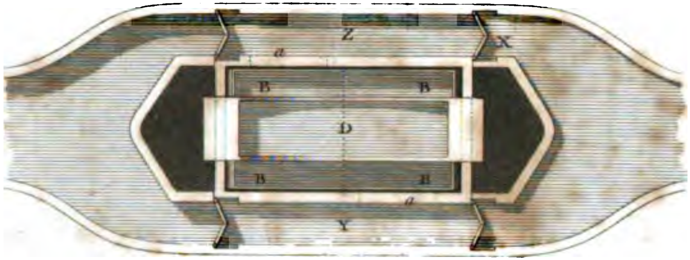


Plan.

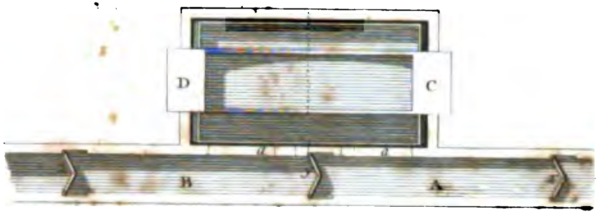
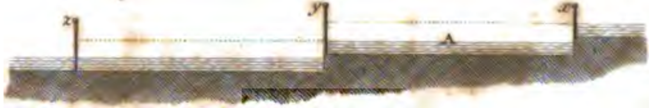
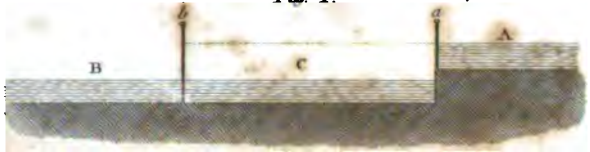


Fig.b 4.



Section of Canal.

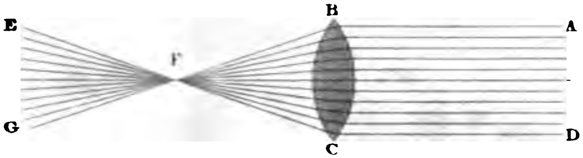
Fig. 1.



W. Newton del. Published by Sherwood & Co. London J.B. Taylor sc.

PLATE II.

Fig. 1.



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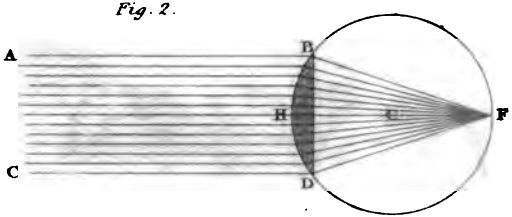

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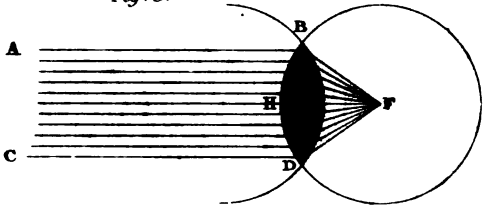

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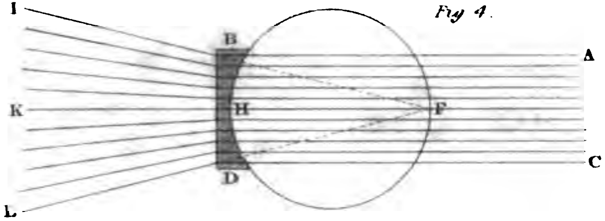

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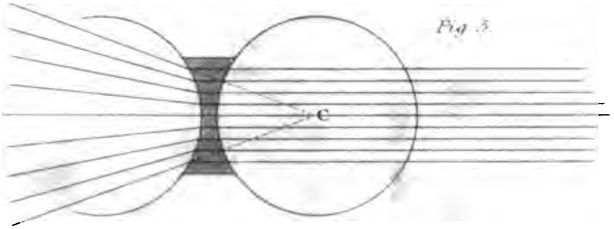

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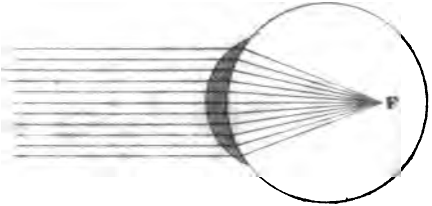

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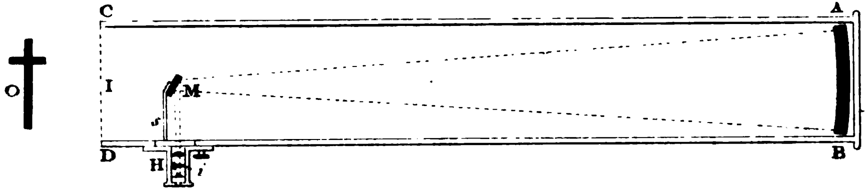
S. Porter sc.

PLATE III.

Fig. 9.



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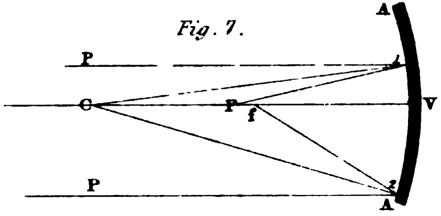

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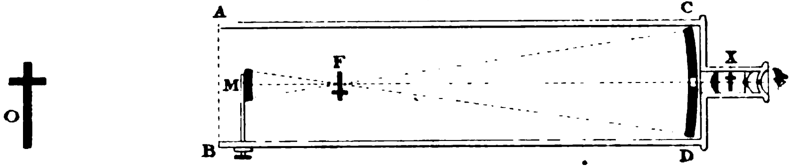

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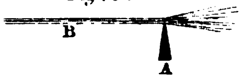

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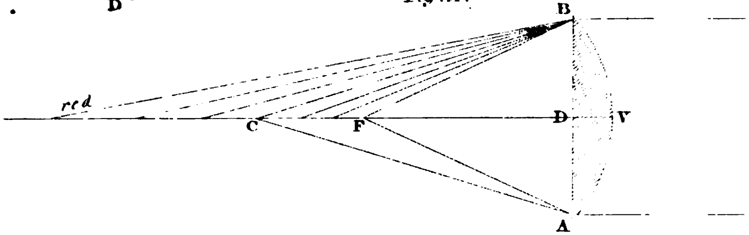

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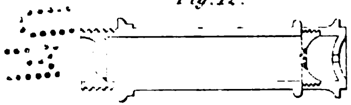

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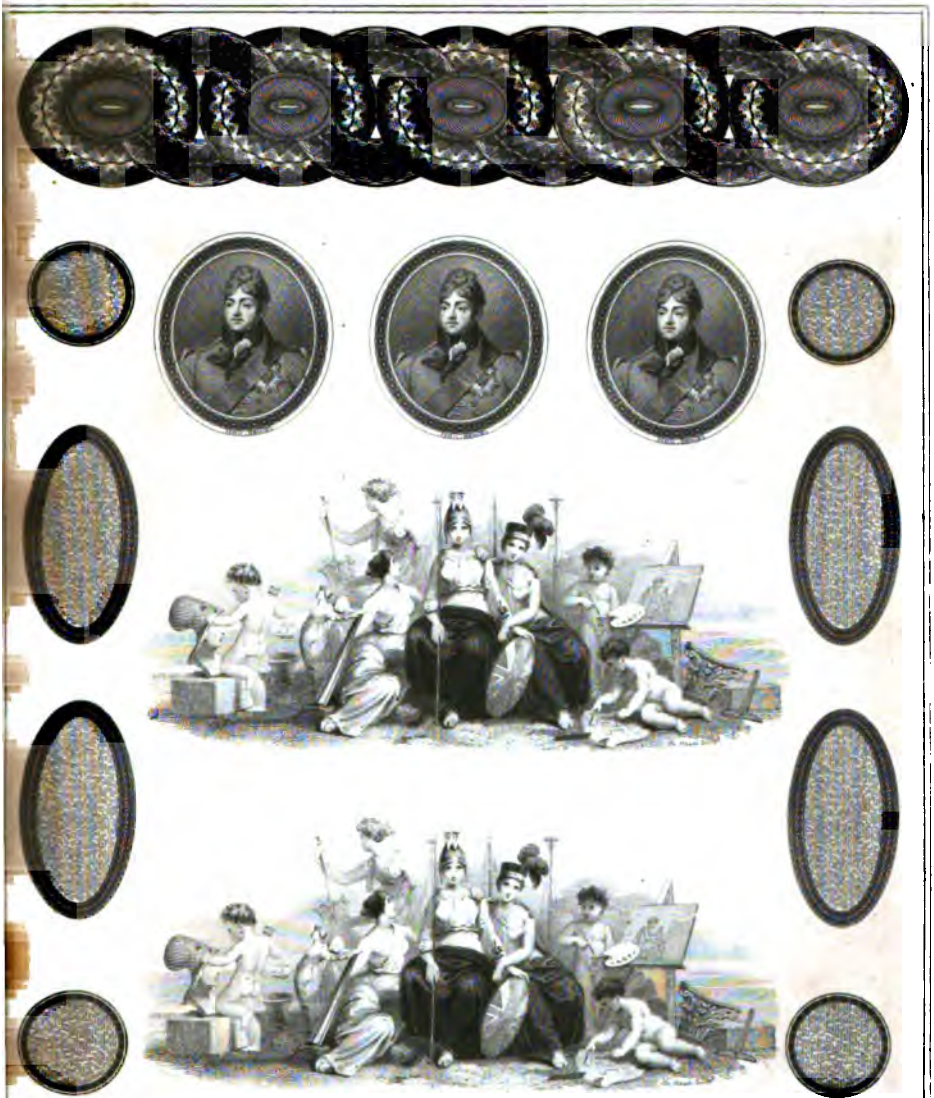
Published by Sherwood & Co. London.

S. Porter. sc.

PLATE IV.



Patent Siderographia, by Perkins, Fairman and Heath

PLATE V.

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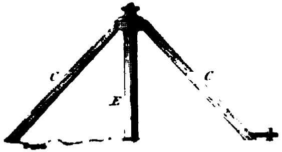

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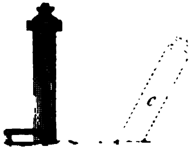

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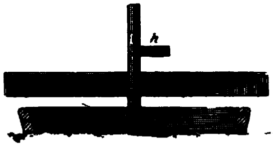

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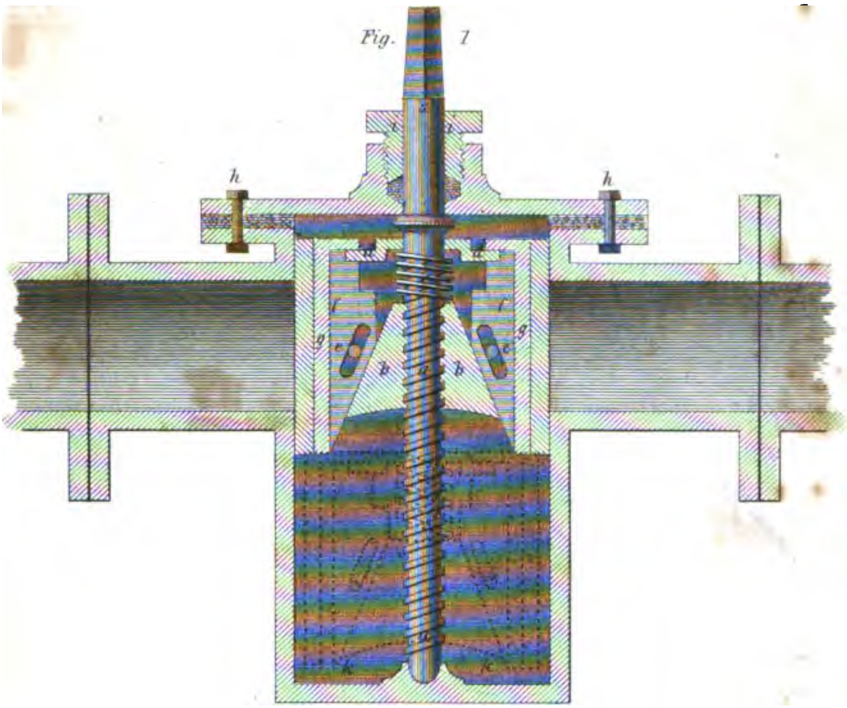

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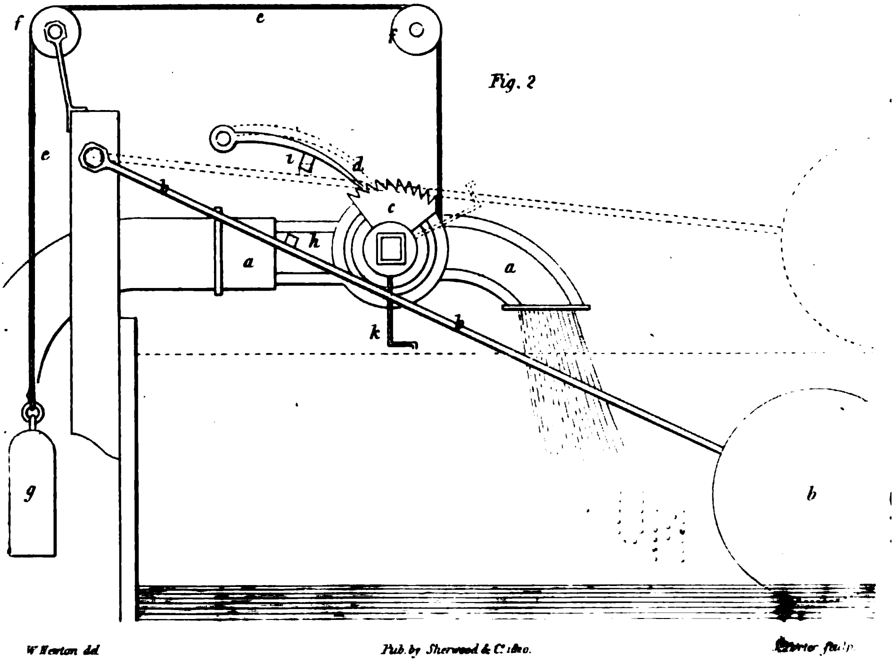


Fig. 2

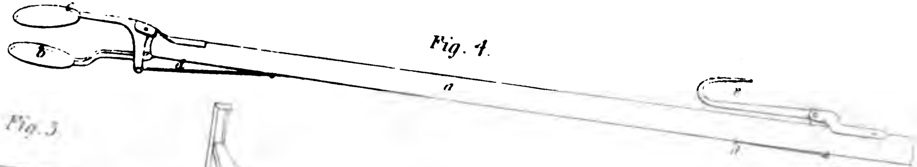
W. Newton del.

Pub. by Sherwood & C.º 1820.

Porter sculp.

PLATE VII.

Fig. 4.



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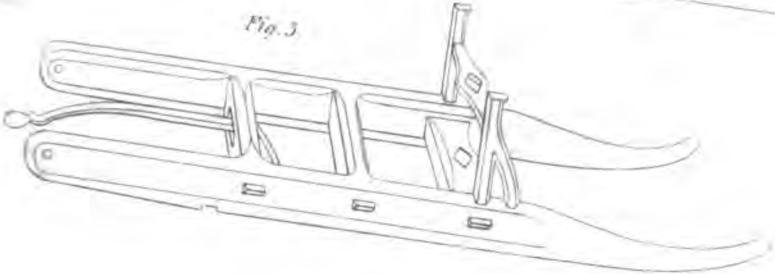

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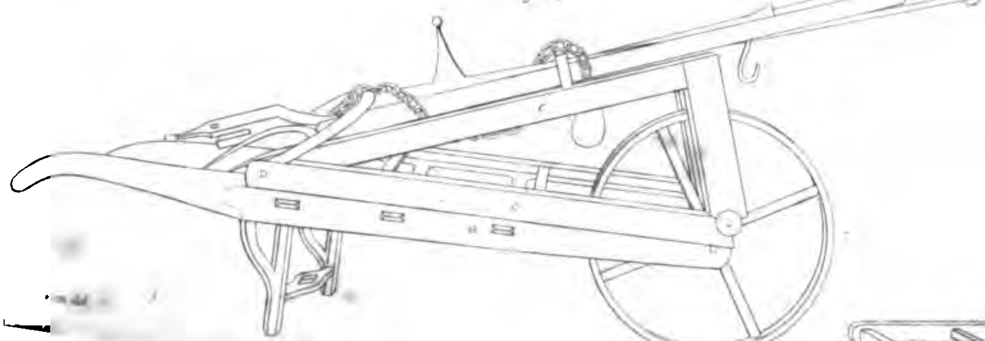

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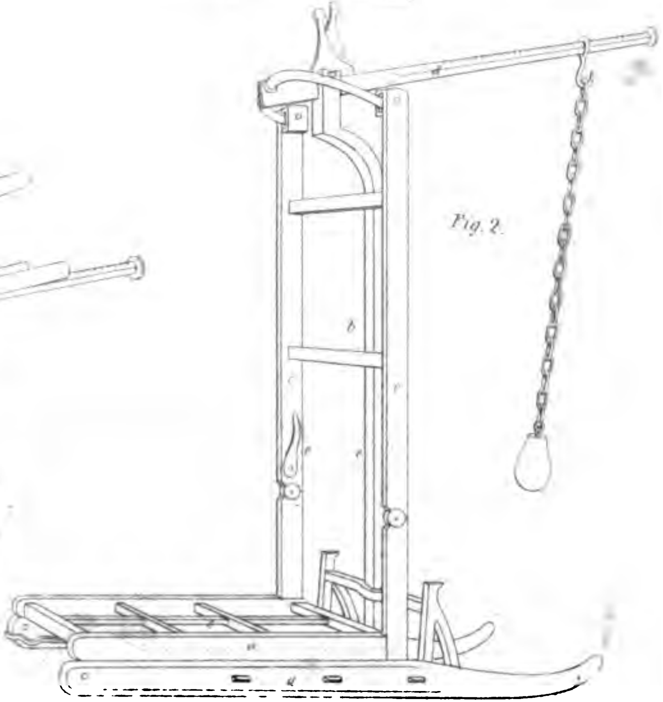

Pub. by Sherwood & C°.

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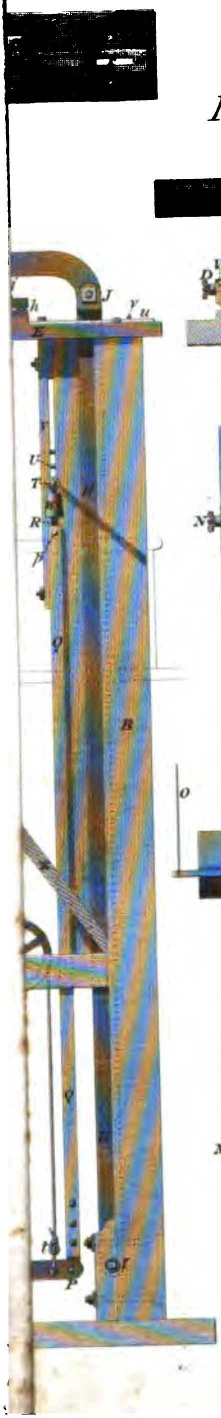

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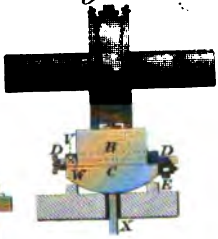

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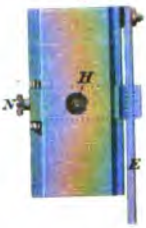

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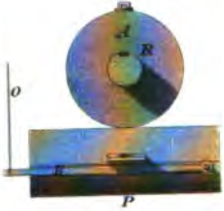

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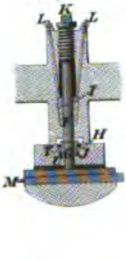
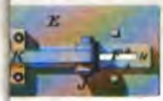


Engd by S.Porter

Plate VIII

2.



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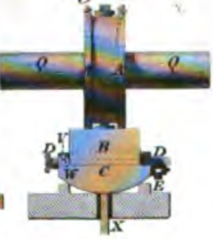

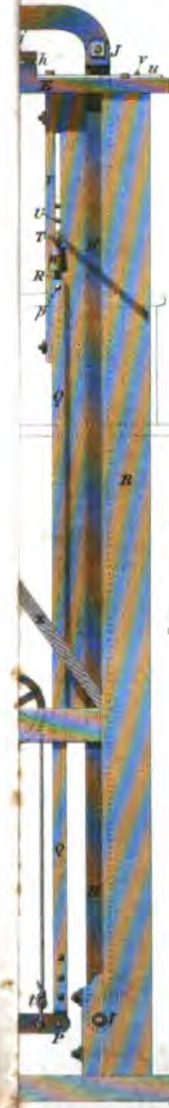

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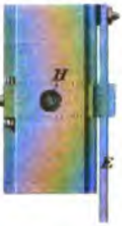

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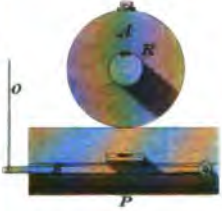

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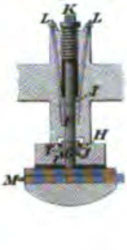
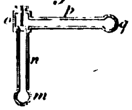


Engd by S.I ..ter

Plate IX



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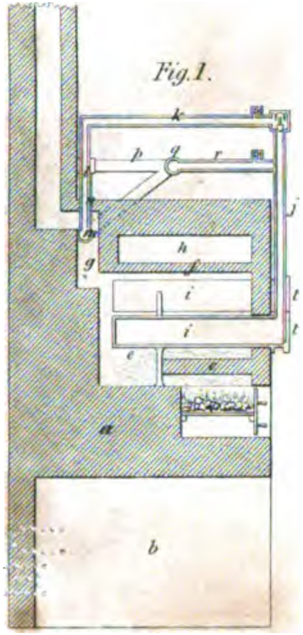

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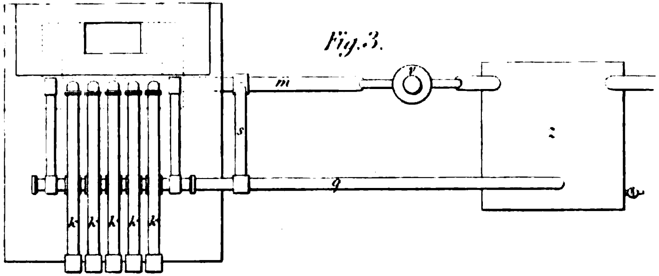

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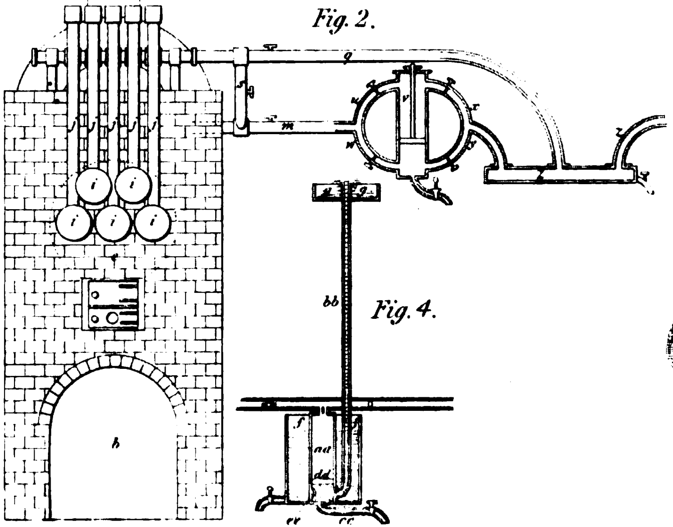
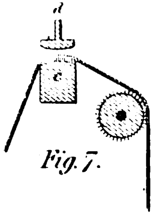


Fig. 2.

Fig. 4.



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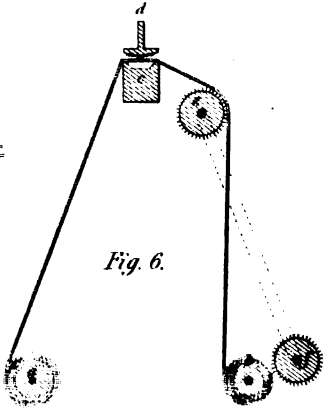
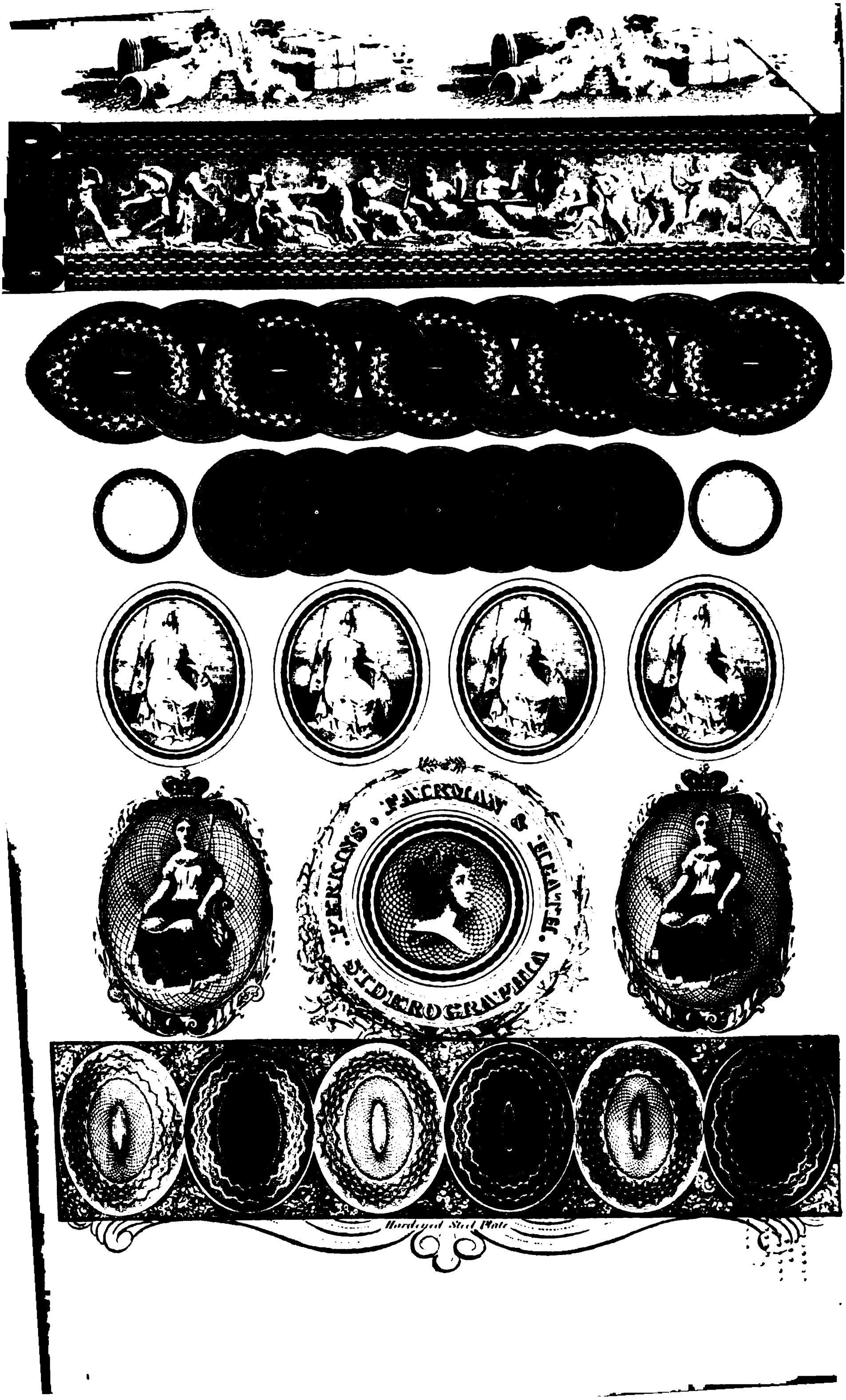


Fig. 6.

[illegible] del. Published by Sherwood & C.º 1820. J. Porter sc.



PERKINS • FAIRMAN & HEATH
SIDEROGRAPHIA
Hardened Steel Plate

MU

Plate XI.

Fig. 3.

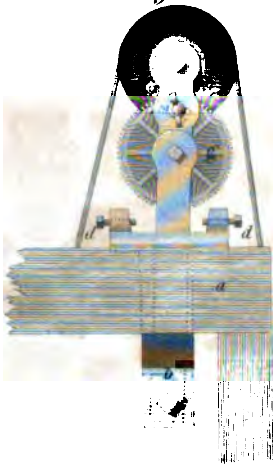
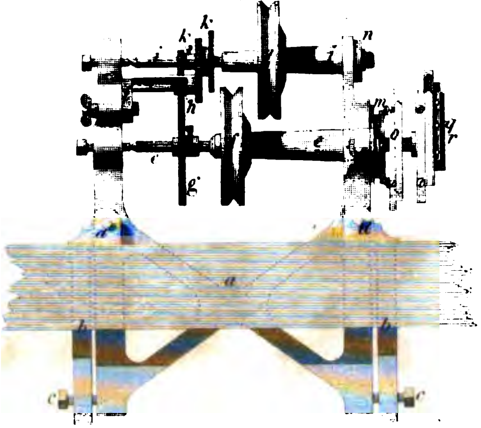


Fig. 1.



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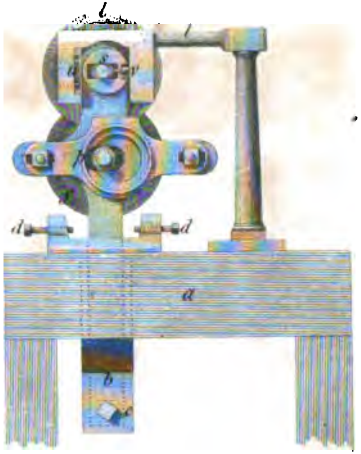
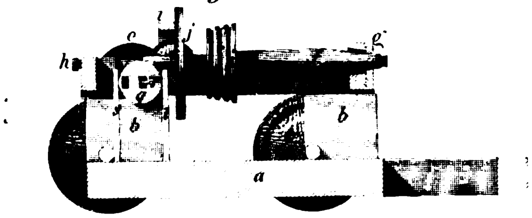


Fig. 5.



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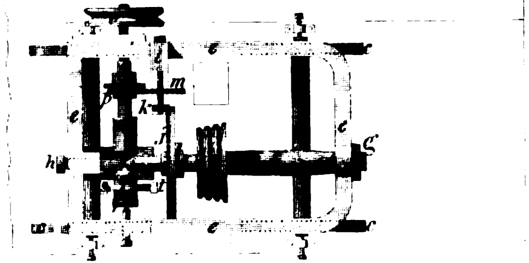


Drawn by W. Newton.

J. Bacon sc.

Plate X

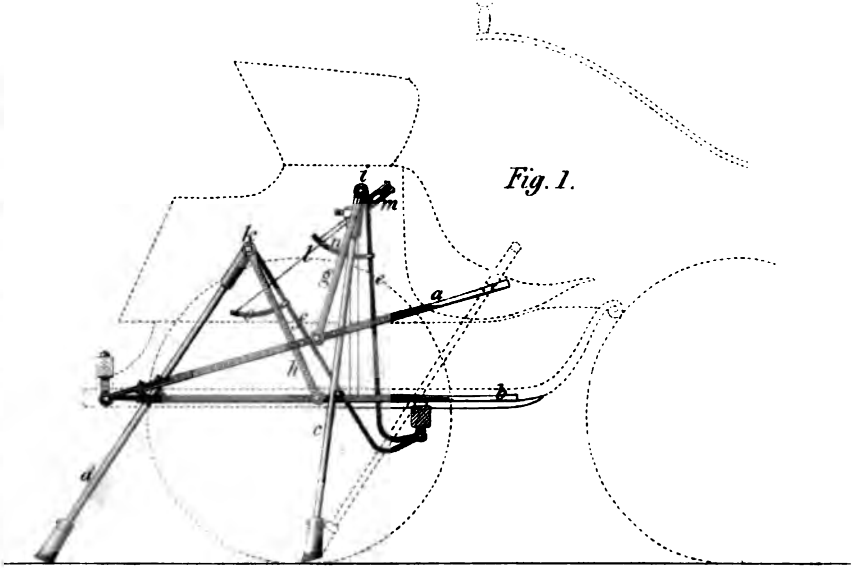
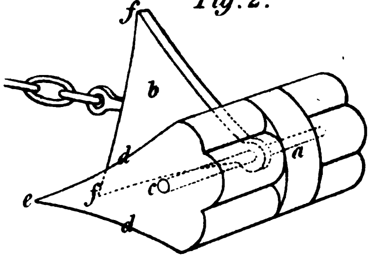


Fig. 1.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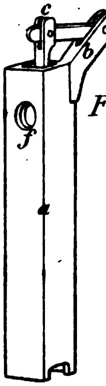
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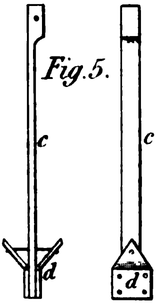
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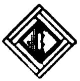
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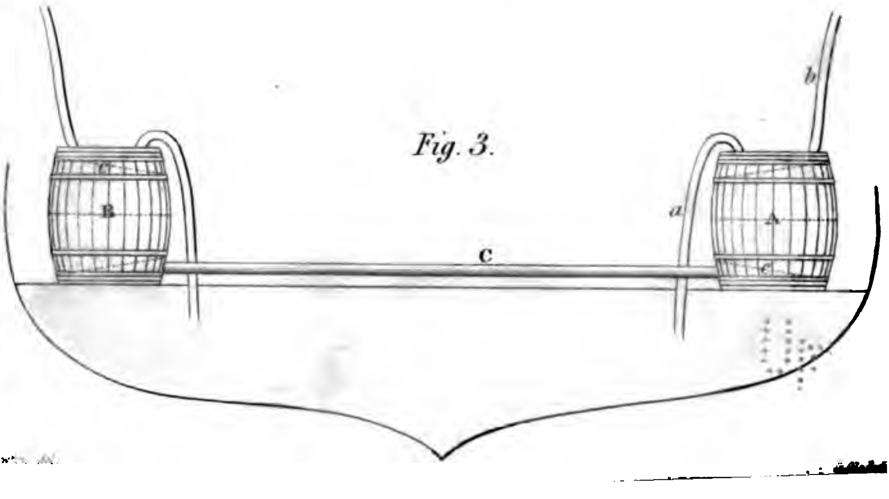


Fig. 3.

Plate XIII.

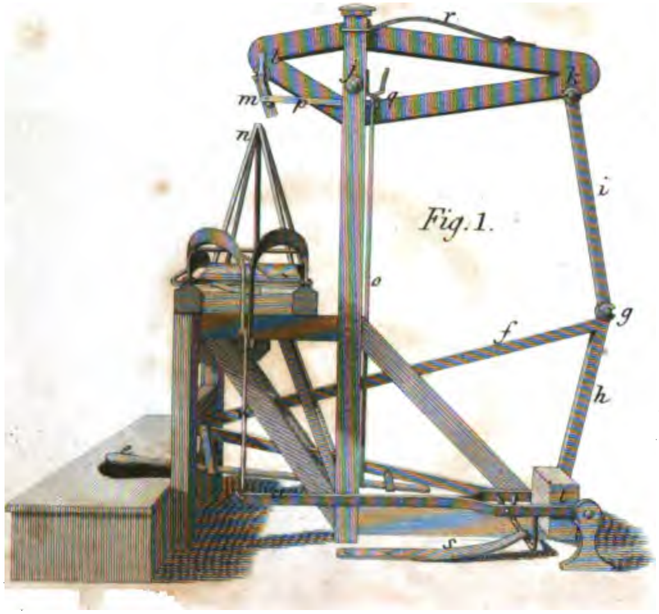


Fig. 1.

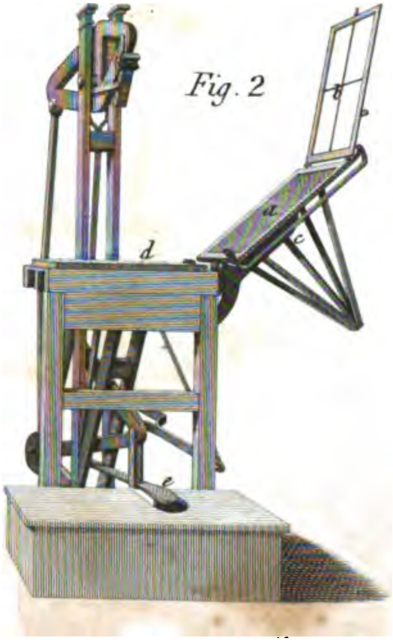


Fig. 2

Fig. 3

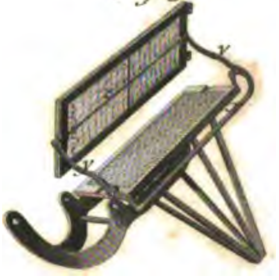


Plate XIV.

Fig. 4

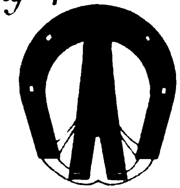


Fig. 5

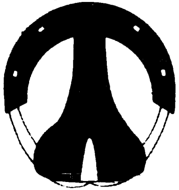
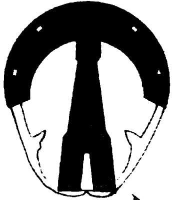


Fig. 6



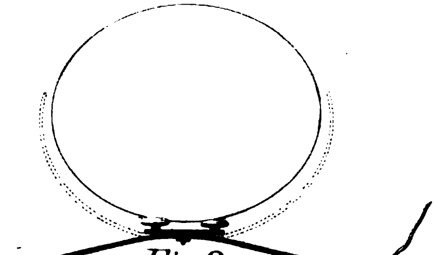


Fig. 8

Fig. 2

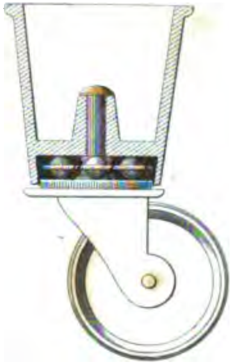


Fig. 1

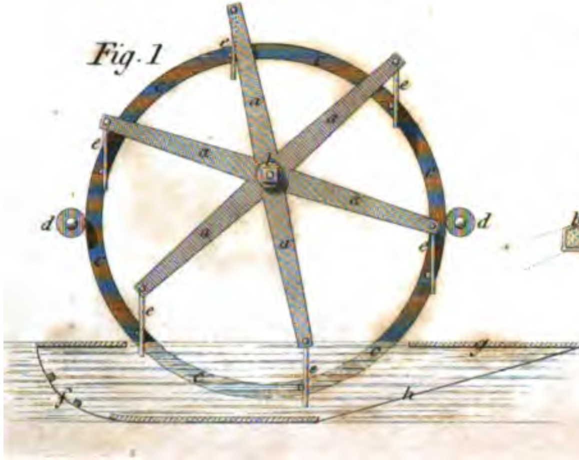


Fig. 7

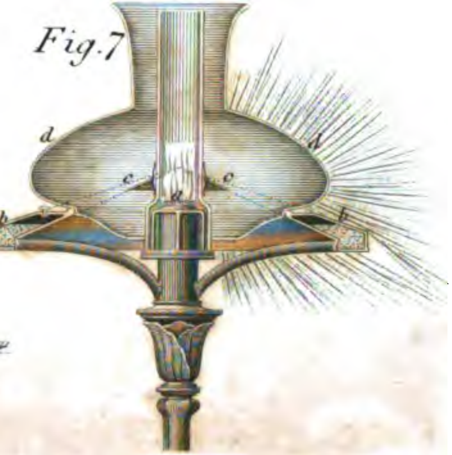
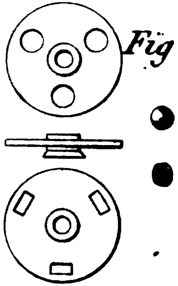


Fig. 3

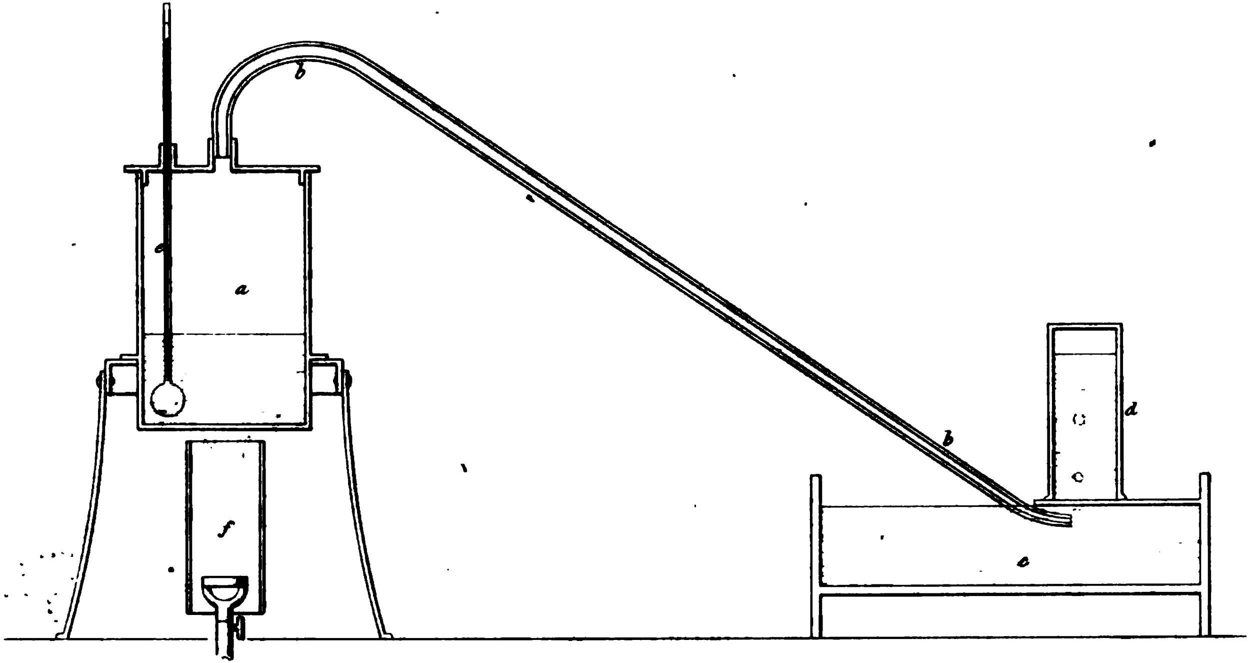


Drawn by W. Newton

Published by Sherwood & Co. 1820.

Engraved by G. Gladwin.

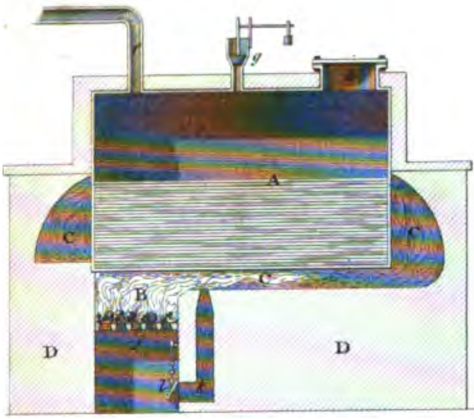
Plate XV.



W. Newton del. Published by Sherwood & Co. 1820. J. Bacon sculp.

PLATE XVI.

Fig. 1.



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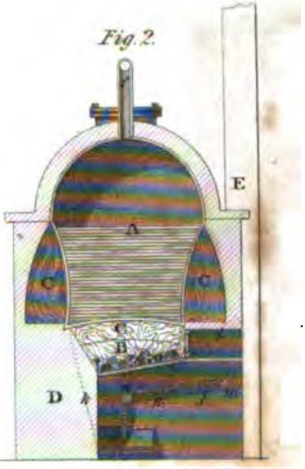

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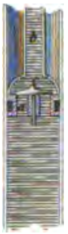

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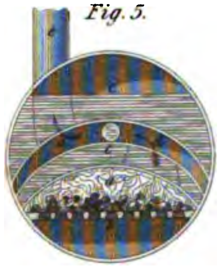

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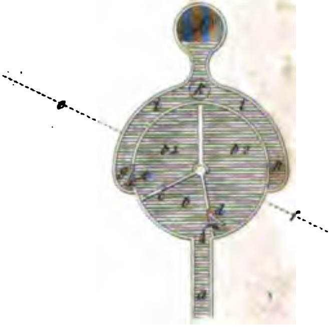

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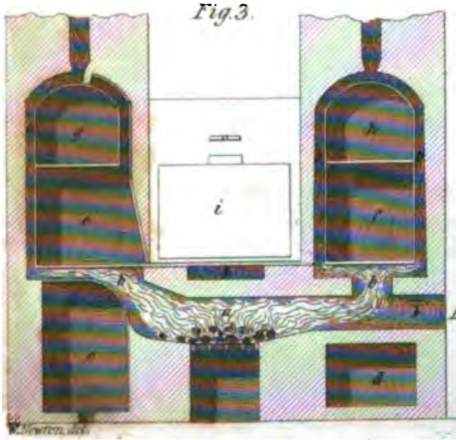

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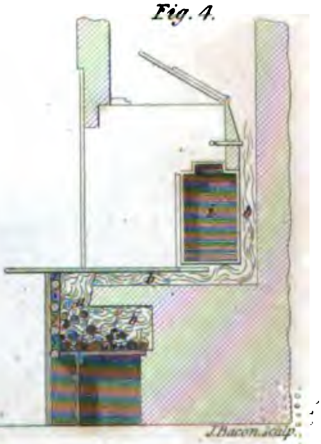
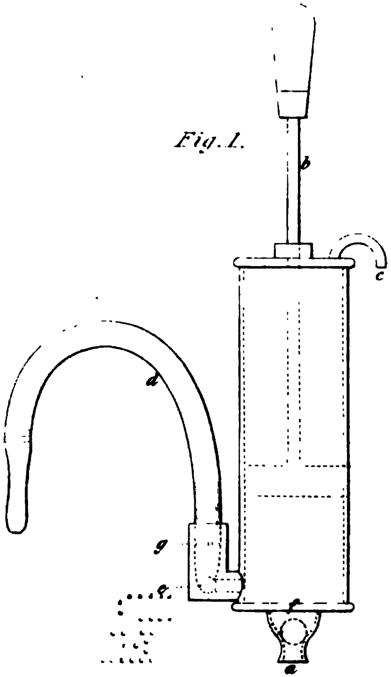


W. Newton, del.

J. Bacon, sculp.

PLATE XVII.

Fig. 1.



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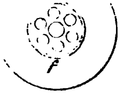
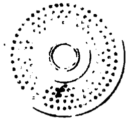


Fig. 3.



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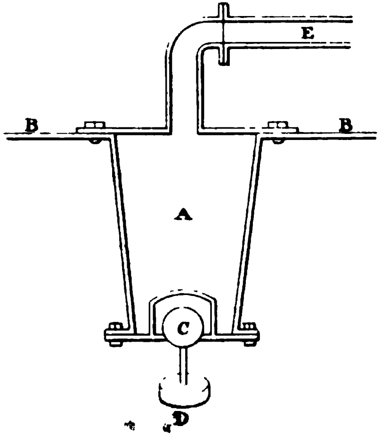
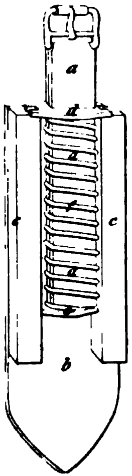


Fig. 6.



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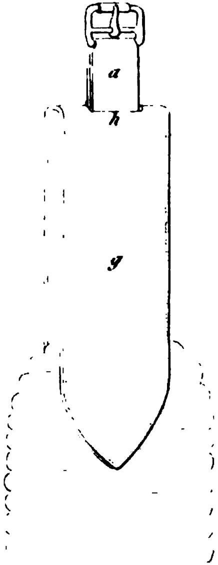
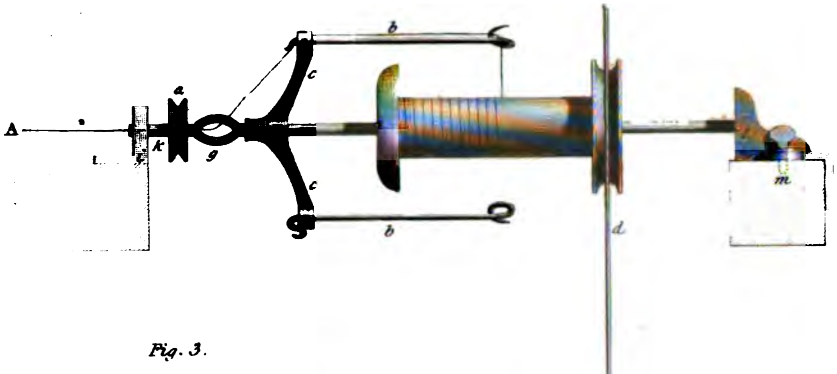


W. Newton del.

J. Bacon sculp.

Plate XVIII.

Fig. 1.



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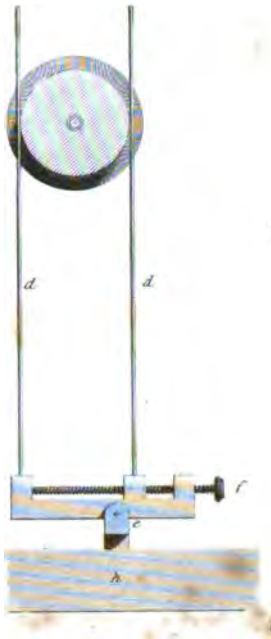
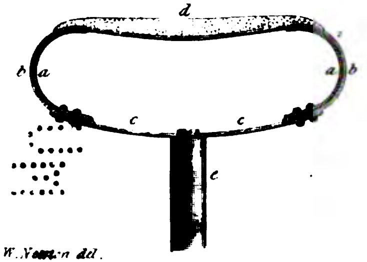
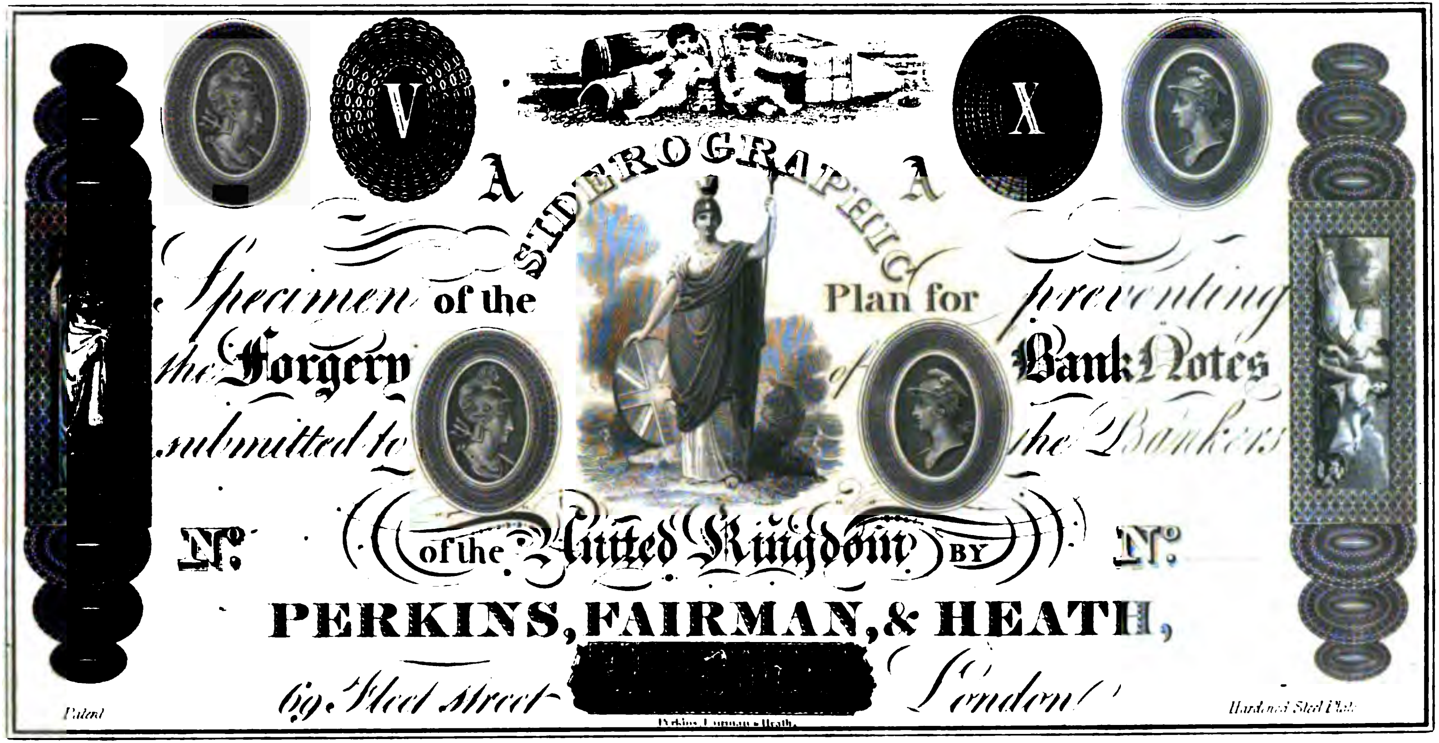


Fig. 3.



W. Newton del.

S. Porter sc.



V

X

A SIDEROGRAPHIC A

Specimen of the Plan for preventing the Forgery of Bank Notes submitted to the Bankers

No. of the United Kingdom BY No.

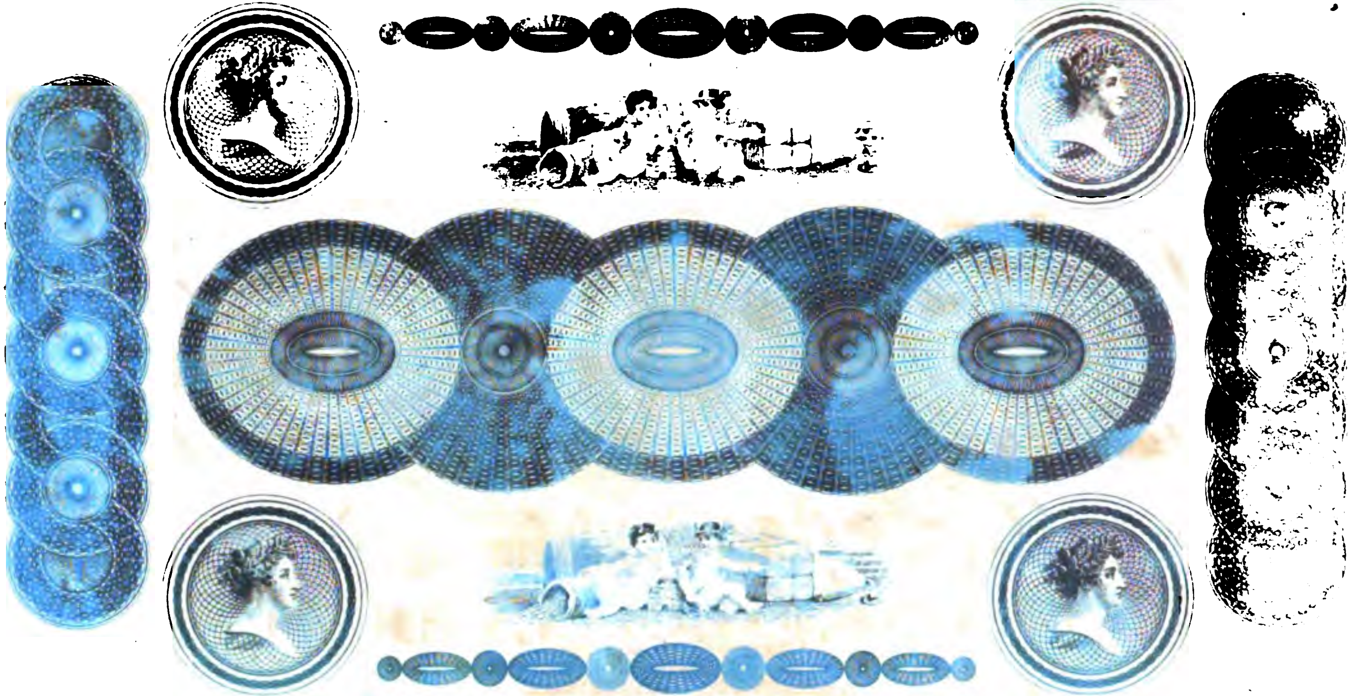
PERKINS, FAIRMAN, & HEATH,

69 Fleet Street London

Patent

Perkins, Fairman & Heath.

Hardened Steel Plate



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